PC40 240 VAC Pattern Control

Part 108 389B

NORDSON CORPORATION • AMHERST, OHIO • USA

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Notice

Trademarks

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Section 1

Safety Summary

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Section 1
Safety Summary

1. Introduction

Section 1 of the applicator manual includes safety guidelines for the use of Nordson equipment. These guidelines apply to all operators and service personnel working with the PC40.

WARNING: Allow only qualified personnel to perform installation and troubleshooting.

In addition to the safety information in the technical manuals, follow the specific safety precautions contained in this manual.

2. Explanation of Terms and Symbols

The following safety symbols and signal words are used throughout this publication, alerting the reader to personal safety hazards, or identifying conditions that can result in equipment or property damage.

WARNING: General Warning. Failure to observe can result in personal injury or death.

WARNING: Risk of electrical shock. Failure to observe can result in personal injury or death.

WARNING: Risk of electrocution. Disconnect equipment from line voltage.

CAUTION: General Caution. Failure to observe can result in equipment damage.

NOTE: Important information.

3. Safety During Installation

WARNING: Risk of serious personal injury or death. Failure to follow the safety and operation information in the technical manuals for the applicator and its associated equipment can result in personal injury or death. Before installing, servicing, or operating the PC40, thoroughly review Section 1, Safety Summary, in the applicator and its associated equipment technical manuals.

WARNING: Risk of electrocution. The AC input power line to the PC40 unit provides voltage that can cause personal injury or death. Before making any electrical connections, disconnect and lock out power to the main circuit breaker for the input power line.

Section 2

Equipment Familiarization

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Section 2
Equipment Familiarization

1. Introduction

The Nordson® PC40 Pattern Control (Figure 2.1) is a time-based control that makes it possible for you to quickly and easily set up, select, or change material application patterns. The PC40 is designed for applications in which material is applied to substrates moving at a constant line speed. For applications in which material is applied to substrates moving at varying line speeds, the Nordson PC44 Pattern Control is required.

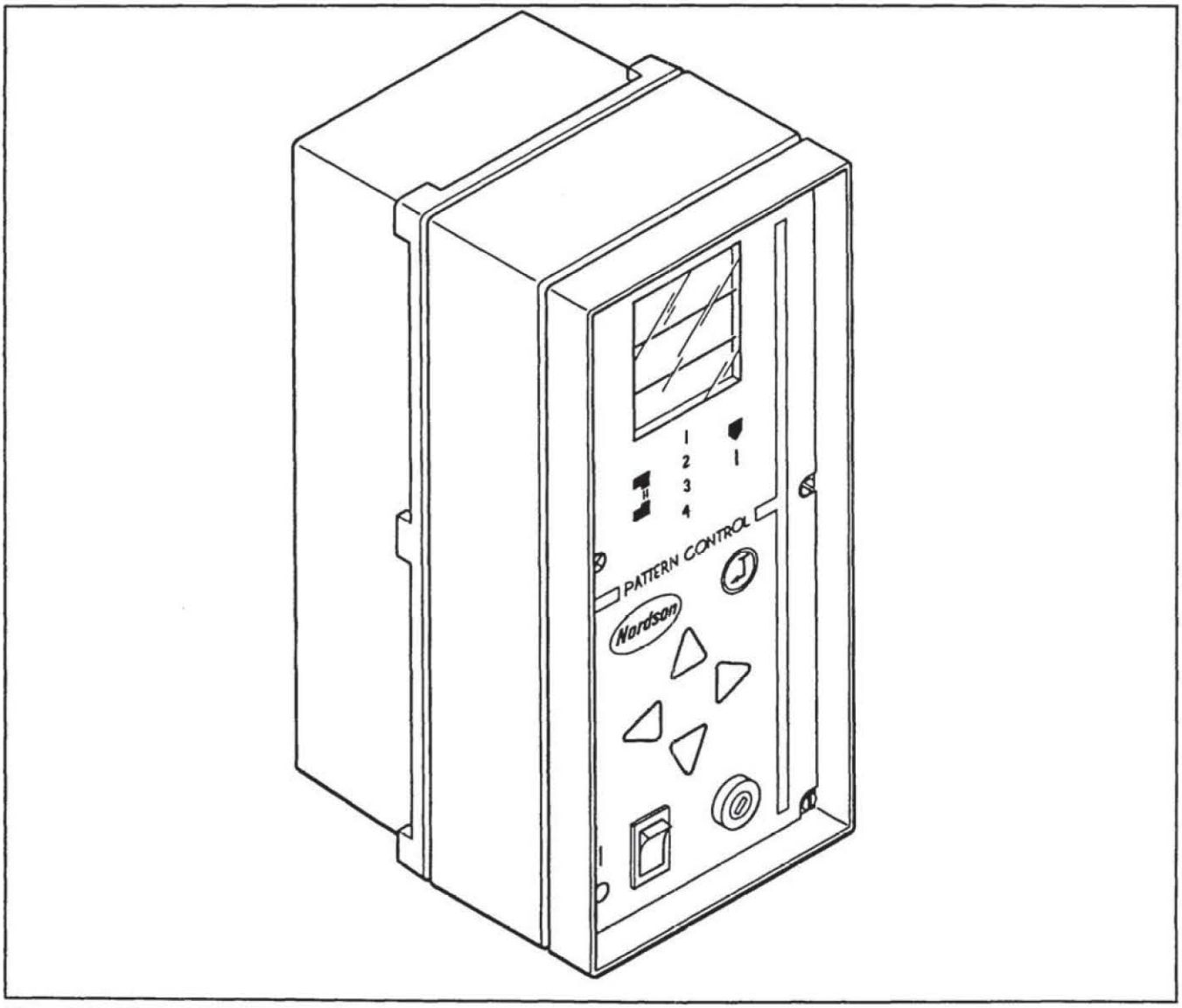

Figure 2.1 - PC40 240 VAC Pattern Control

NOTE: The PC40 240 VAC Pattern Control is designed for use only in geographic regions where 240 VAC with a grounded neutral is the industrial standard. If 120 VAC with a grounded neutral is the industrial standard at your site, consider using either the PC40 AC Pattern Control (P/N 131 712), or the PC40 DC Pattern Control (P/N 131 709) and PS40 DC Power Supply (P/N 131 739).

NOTE: The PC40 240 VAC Pattern Control uses 220/240 VAC solenoids to actuate pneumatic guns. The unit should not be used to actuate electric gun drivers. If you are using electric gun drivers, order the PC40 DC Pattern Control (P/N 131 709) and PS40 DC Power Supply (P/N 131 739).

This section covers the following topics:

- A functional description of the PC40
- A description of the PC40 user interface
- A description of the four Nordson photoelectric sensors
- A description of the PC40 remote communication capabilities

2. PC40 Functional Description

The PC40 controls the deposit of material on a moving surface (substrate). Figure 2.2 provides a block diagram that illustrates the process involved.

1. A trigger device (e.g., a photoelectric sensor) senses the approach of the leading or trailing edge of the substrate. The trigger then sends an electrical signal to the PC40.
2. The PC40's ASIC (Application Specific Integrated Circuit) executes the timing sequences.
3. The PC40 activates one to four output channels by sending an electrical signal to one or more gun solenoids.
4. Air moves through the solenoid and into the extrusion gun. This lifts a piston in the gun which allows hydraulically-fed material to flow out of the gun onto the substrate.
5. When the user-defined pattern is completed, the PC40 stops sending an open signal to the channel(s). The solenoid closes, airflow to the gun piston ceases, air in the gun is released through the solenoid exhaust, the gun piston closes, and material stops flowing to the substrate.

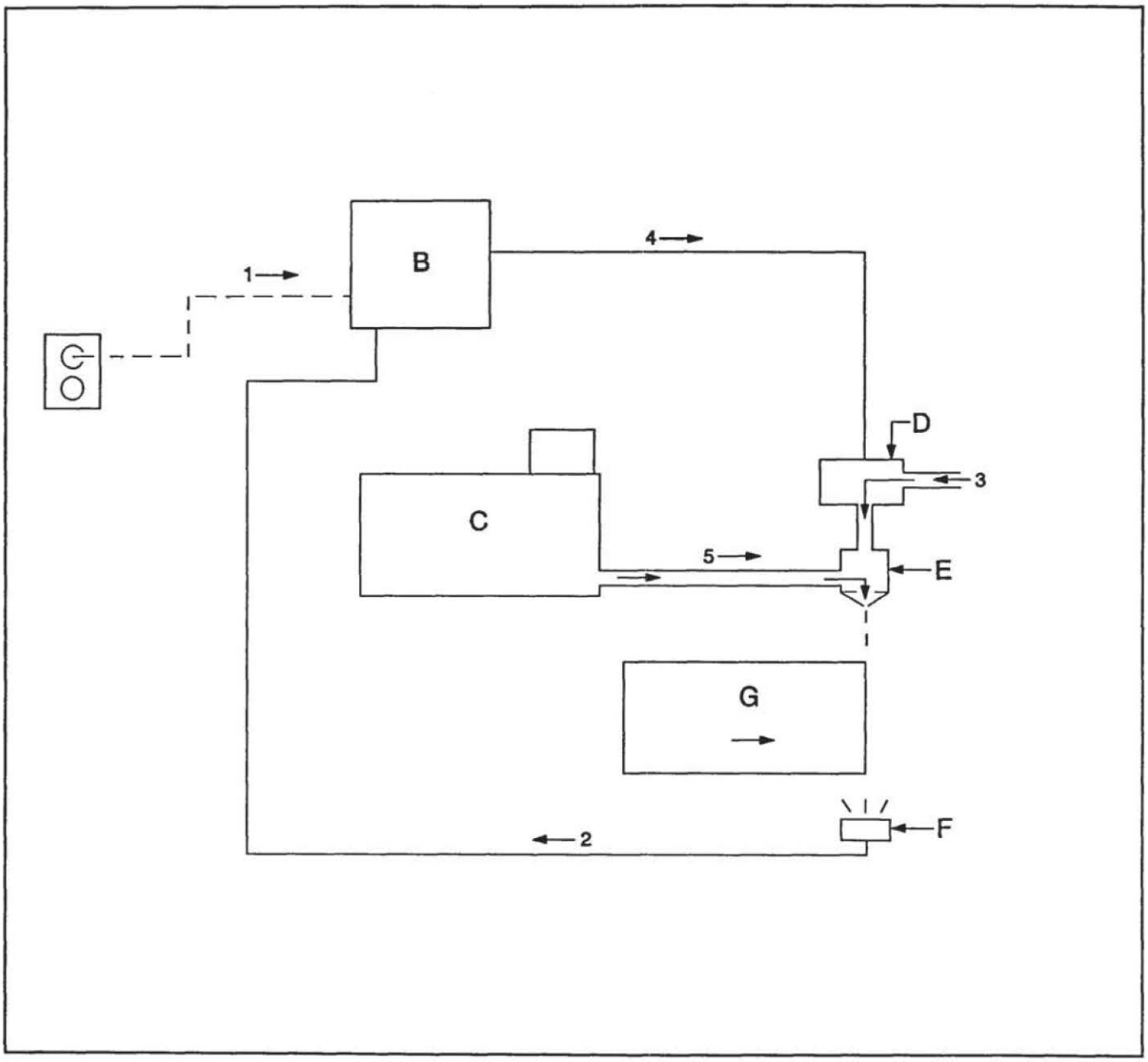

Figure 2.2 - PC40 block diagram

B – PC40 Pattern Control
C – Applicator
D – Solenoid
E – Gun
F – Trigger
G – Substrate

1 – Input voltage (240 VAC)
2 – Trigger signal
3 – Input air to solenoid
4 – Electrical input signal to solenoid
5 – Material flow

3. PC40 User Interface

The PC40 front panel (Figure 2.3) consists of an LCD, nine indicator LEDs, six membrane push buttons, a power switch and a fuse.

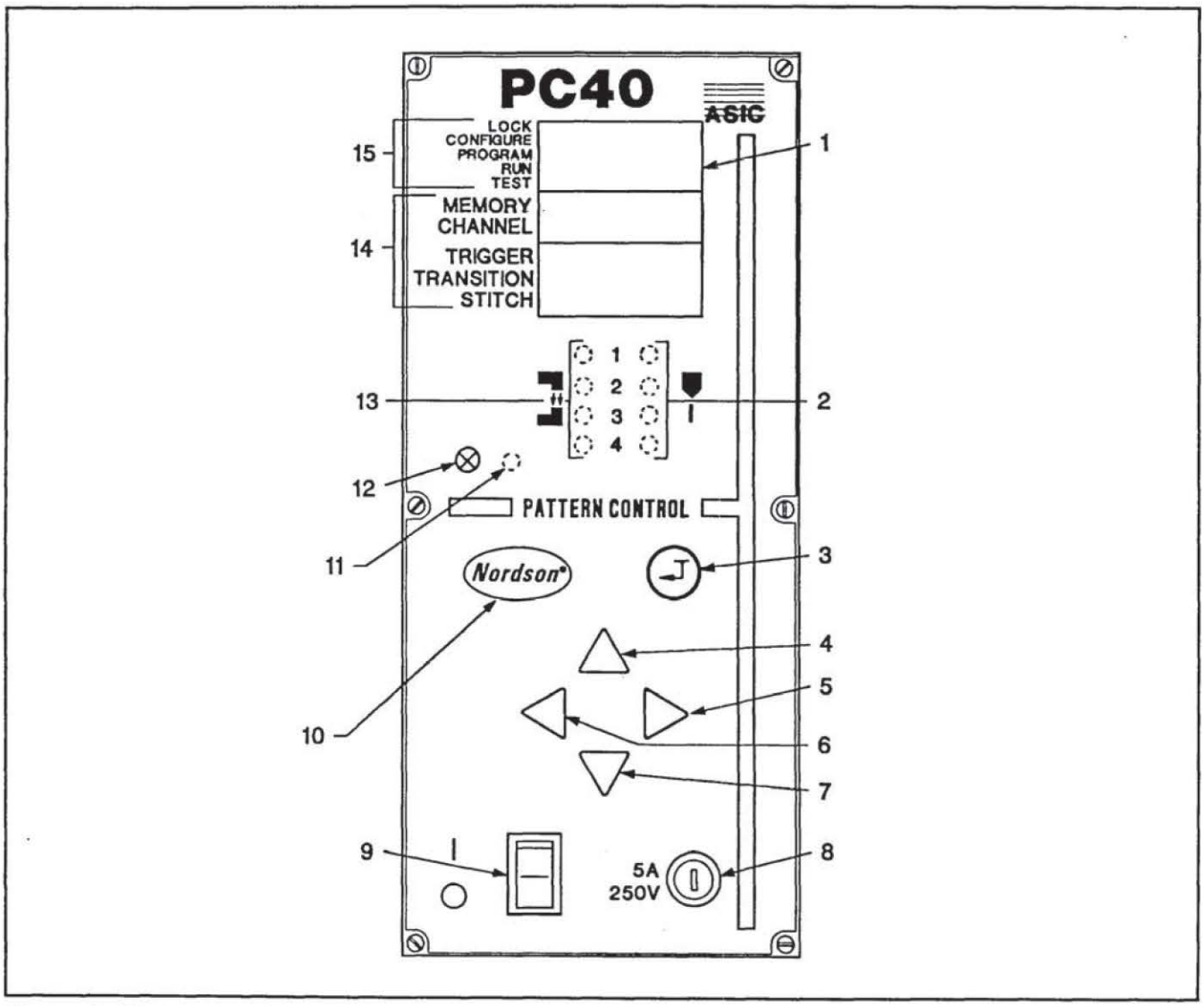

Figure 2.3 - PC40 front panel

1 – LCD
2 – Output LEDs (green)
3 – Set push button
4 – Up pus(button
9 – Power switch
10 – Nordson Oval push button
*11 – StattBLED**
Gree& = power on, unit operati'lx|

LCD

Blue alphanumeric characters are displayed against a gray background (Figure 2.4).

NOTE: Figure 2.4 is for familiarization only; these symbols are never all displayed at the same time.

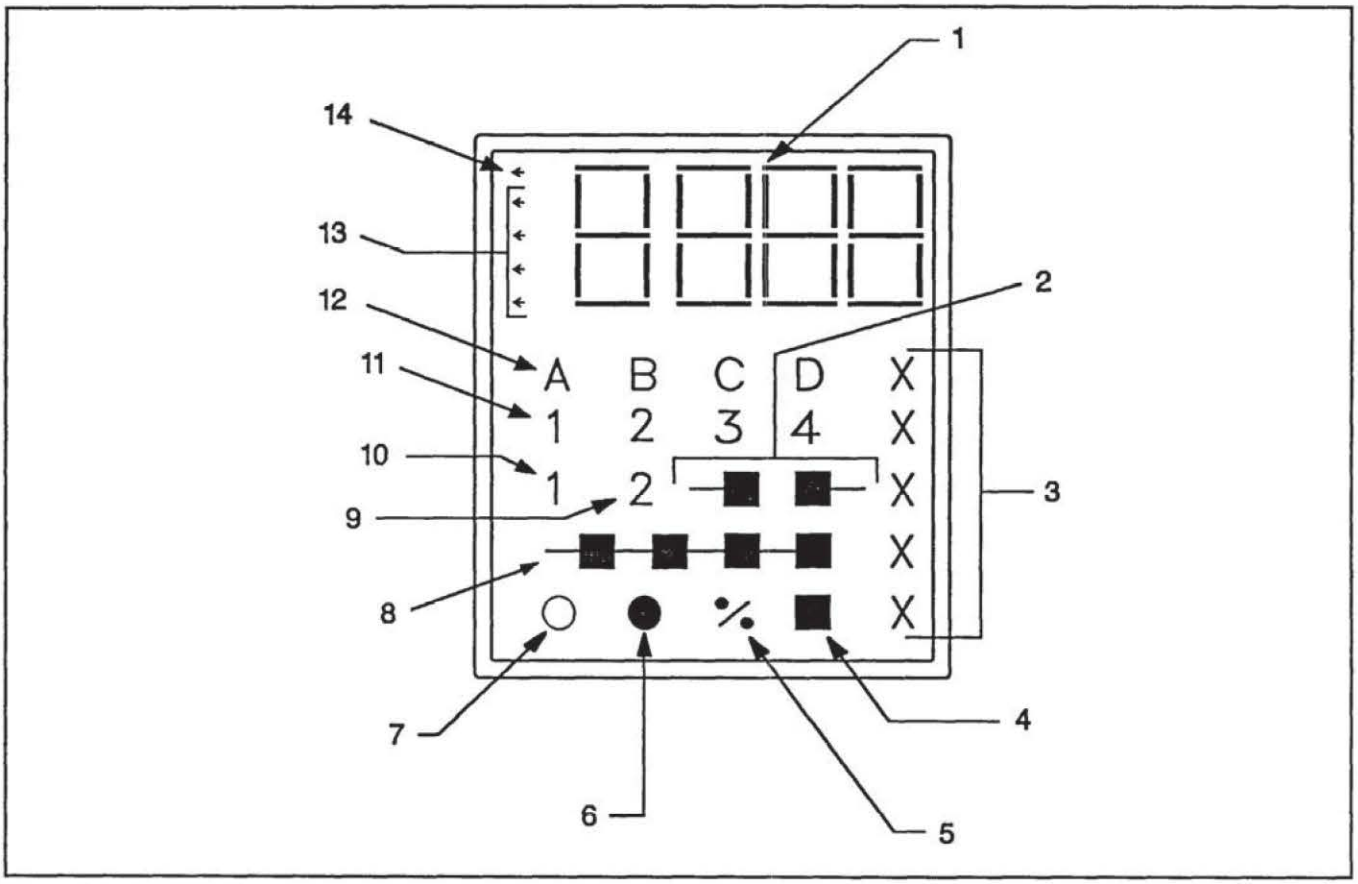

Figure 2.4 - PC40 LCD

1 – Numerical display
2 – Leading or trailing edge symbols
3 – Selection level indicators
4 – Stitch bead length symbol
5 – Stitch coverage symbol
6 – Stitch on symbol
7 – Stitch off symbol
8 – Transition symbols
9 – Two-trigger symbol
10 – Single trigger symbol
11 – Channel symbols
12 – Memory symbols
13 – Mode indicator arrows
14 – Lock indicator arrow

4. Nordson Photoelectric Sensors

There are four photoelectric sensors that are available from Nordson for use as trigger devices with the PC40:

- (1) Opposed Mode (Through Beam) Sensor, which consists of an Emitter and a Receiver
- (1) Diffuse Reflective (Proximity) Sensor
- (2) Retroreflective Sensors

Opposed Mode (Through Beam) Sensor

This sensor consists of two units: an LED light source (emitter) mounted opposite a light-sensing phototransistor (receiver). The light beam is broken as the substrate passes between the emitter and the receiver (Figure 2.5). This sensor is effective up to a range of 10 ft (3 m).

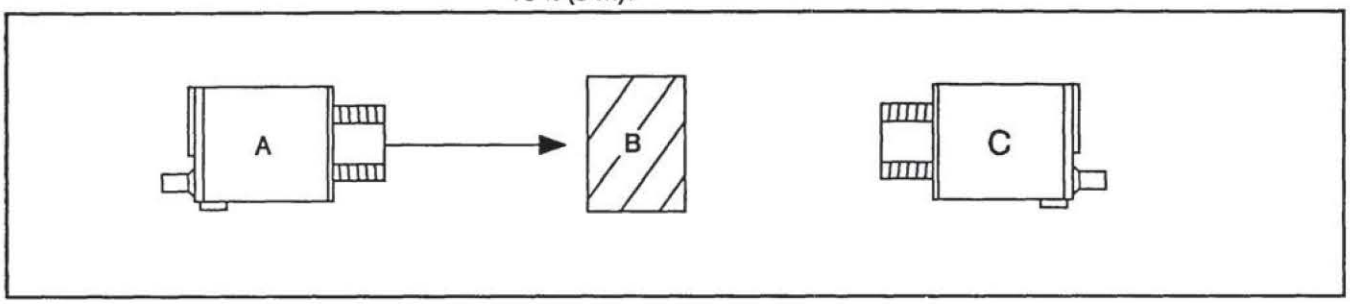

Figure 2.5 - Opposed mode (through beam) sensor

A – Emitter
B – Substrate
C – Receiver

Diffuse Reflective (Proximity) Sensor

This sensor (Figure 2.6) consists of a single unit that contains both the LED light source (emitter) and the light-sensing phototransistor (receiver). The diffuse mode sensor detects its own emitted light reflected off the substrate. The light beam is broken when there is no substrate opposite the sensor (no reflecting surface). This sensor is effective up to a range of 15 in. (38.1 cm).

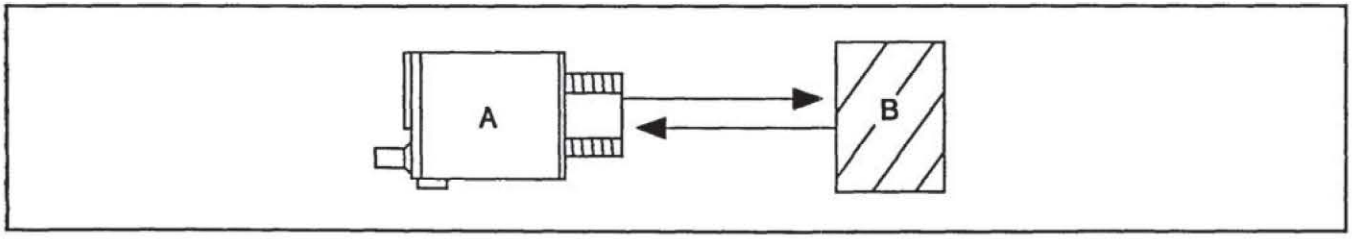

Figure 2.6 - Diffuse reflective (proximity) sensor

A – Emitter/Receiver
B – Substrate

Retroreflective Sensors

This sensor consists of a single unit that contains the LED light source (emitter) and the light-sensing phototransistor (receiver). The emitter/receiver bounces its light off an opposing retroreflector or reflective tape and "sees" the reflected light. The light beam is broken as the substrate passes between the sensor unit and the reflector (Figure 2.7).

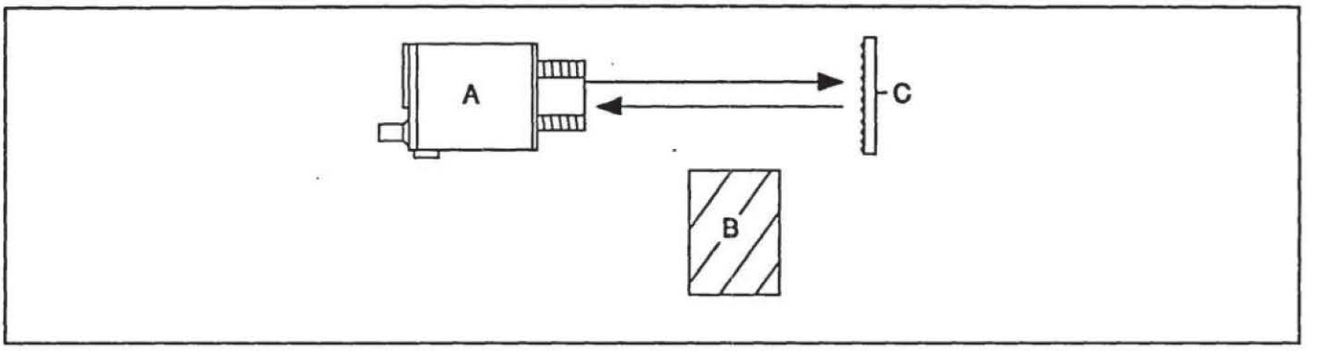

Figure 2.7 - Retroreflective sensor

A – Emitter/Receiver
B – Substrate
C – Retroreflector

- Retroreflective Polarizing Model - This anti-glare unit polarizes the emitted light and filters out unwanted reflections. It has an effective range of 2 in. (5.1 cm) to 7 ft (2.1 m).
- Retroreflective Model - This is a non-polarized sensor that is effective up to a range of 15 ft (4.5 m).

5. Remote Communications

Remote Memory Selection

Purpose

The PC40 has the capability to connect to a remote device which can change the active memory. The unit can also provide +12V power for the remote device. Wiring information for the Nordson Remote Memory Select Switch is included in Section 3, Installation.

Remote Lock Out Interface

Purpose

The PC40 will prevent access to the PROGRAM, CONFIGURE, and TEST modes after receiving an input signal from a remote device. While in LOCK, programming changes cannot be made using the PC40 user interface. Wiring information for the Nordson Keyed Lock Out Switch is included in Section 3, Installation.

Screen Display

The arrow symbol in the mode segment of the LCD will point to "LOCK" when this feature is enabled.

Section 3

Installation

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Section 3
Installation

1. Introduction

This chapter includes information on inspecting and installing the Nordson® PC40 Pattern Control and associated equipment:

- the gun solenoids,
- the Nordson Sensors,
- the Nordson Remote Memory Select Switch, and
- the Nordson Keyed Lock Out Switch.

2. Inspection

After unpacking, check that you have the pattern control and other equipment that you ordered (see Section 6 for part number information). Inspect all components for dents, cracks, scratches, or other evidence of physical damage. If you find any damage, contact your Nordson sales representative before installing the equipment.

3. Safety During Installation

WARNING: Personal injury hazard. Failure to review the safety information in Section 1, Safety Summary, of this manual can result in equipment damage, personal injury or death. Before installing this equipment thoroughly review Section 1. Also, follow the specific safety precautions in this section.

4. Installation Tips and Hints

Wire Gauge

The table below specifies the proper gauge wire for the various electrical connections, regardless of the wire length.

Table 3.1 - Recommended Wire Guages

Connection	Wire Gauge
AC	14 - 16
Solenoids	16 - 18
Remote Memory Select Switch and Keyed Lock Out Switch	18 - 22

Avoiding Inductive Interference (Electrical Noise)

- Avoid routing wires near AC power lines, solenoid output lines, and electrical devices such as motors, contactors, and relays.
- Use shielded cable.
- Avoid using excess wire lengths, which can act as an antenna. Use only as much wire as needed to make connections.

Limit Switches (if used)

- Limit switches should be "normally closed." This will provide a stable sensor signal.
- Limit switches can bounce when actuated. This can cause a false trigger. De-bounce limit switches by installing a 0.1 microFarad capacitor across the contacts.

5. Mounting the PC40 Back Enclosure

NOTE: In order to achieve an IP-54 Enclosure Rating (splash-resistant environment), Nordson recommends that you route all PC40 input and output electrical connections through water-tight conduit and a junction box. Use 1 in. (2.5 cm) conduit fitting, and locate the conduit center line 1 in. (2.5 cm) from the wall.

NOTE: Before mounting the PC40, make sure that you have sufficient space to mount it. The unit is 4.0 in. wide (10.2 cm) by 9.0 in. high (22.9 cm) by 4.44 in. deep (11.3 cm).

Wall or Machine Mounting

1. Loosen the six screws that secure the PC40 back enclosure to the front assembly (Figure 3.1).
2. Pull the front assembly away from the back enclosure.
3. Set the front assembly in a safe place.
4. Position the back enclosure knockout hole for the direction the electrical wiring will route into the PC40.
5. Place the back enclosure against the mounting surface at the location you want to mount it.
6. Mark the centers of the two PC40 screw holes on the mounting surface. Make sure that the center of the marks are 6 in. (15.24 cm) apart from center to center.
7. Drill two 7/32 in. (5 mm) holes in the mounting surface where marked.
8. Use the two M4 x 25 mm screws, nuts, and washers provided to fasten the back enclosure to the mounting surface (Figure 3.2).

Wall or Machine Mounting

(continued)

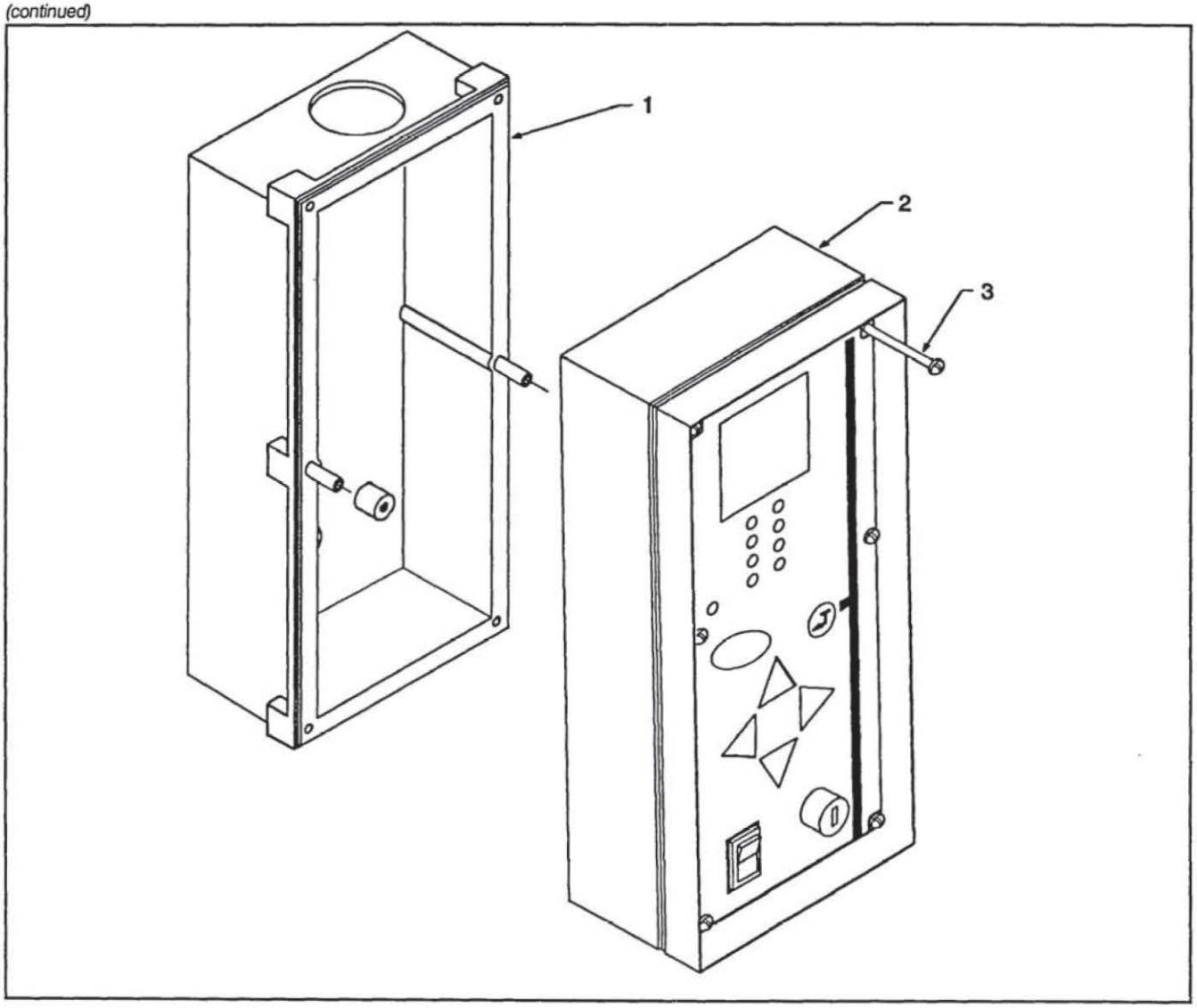


Figure 3.1 - Removing the PC40 front assembly

1 – Back enclosure
2 – Front assembly
3 – Screw (1 of 6)

DIN Rail Mounting

NOTE: Before mounting the PC40, make sure that you have sufficient space to mount it. The unit is 4.0 in. wide (10.2 cm) by 9.0 in. high (22.9 cm) by 4.44 in. deep (11.3 cm).

Use the parts provided with the PC40 (Figure 3.3) to install the unit to DIN rails as follows:

Mounting to Vertical Rails

1. Fasten the end bracket provided with the unit to the DIN rail by tightening the stop screw (Figure 3.3).

DIN Rail Mounting

(continued)

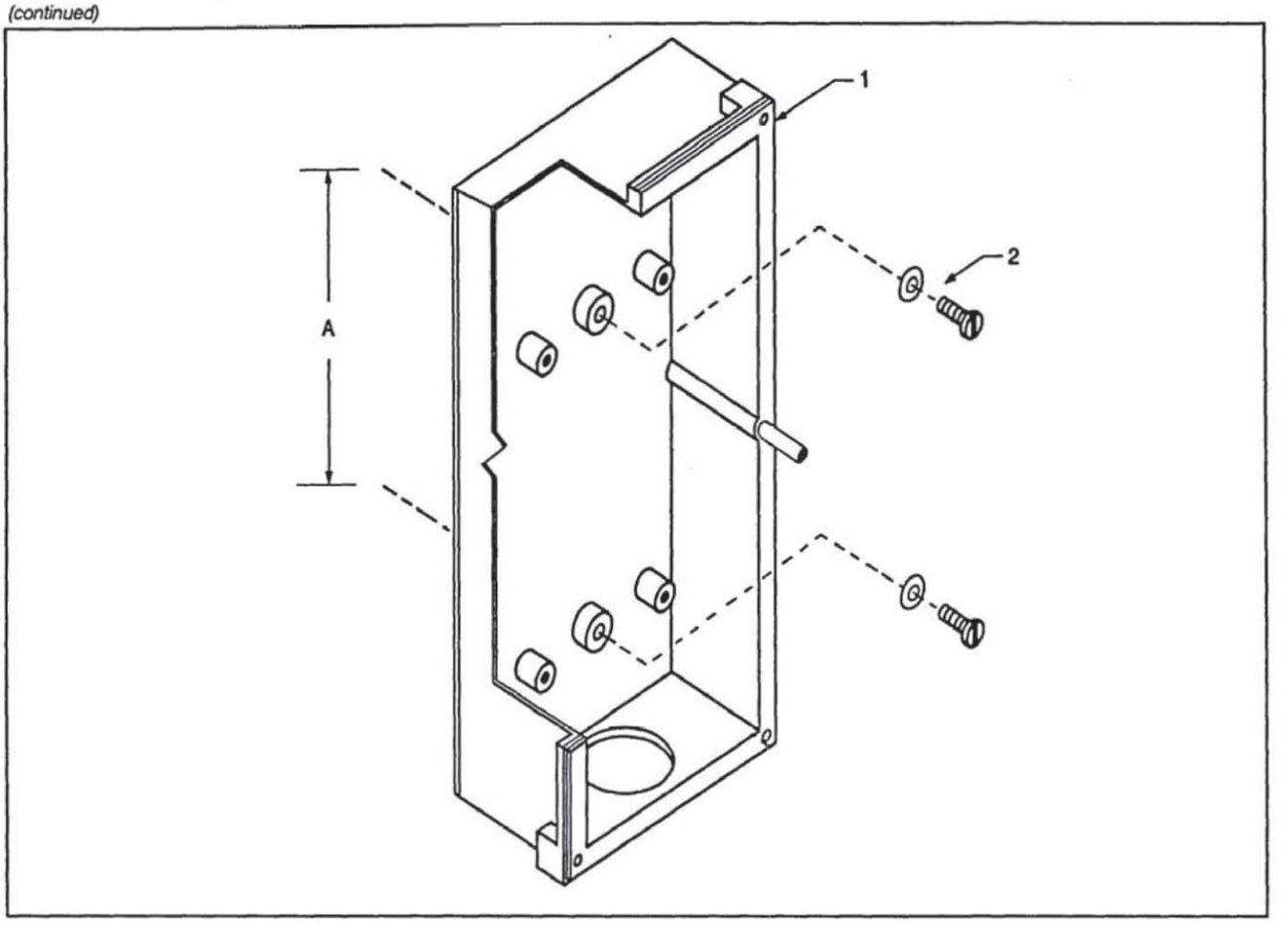


Figure 3.2 - Mounting PC40 to wall or machine surface

A – 6 in. (15.2 cm)
1 – Back enclosure
2 – Screw with washer (nut not shown); 1 of 2

2. Use the two M4 x 12 mm screws to secure the two clips to the back enclosure; make sure that they are oriented for mounting to the vertical rail (Figure 3.3).
3. Fasten the back enclosure to the DIN rail by snapping the clips into the rail.

DIN Rail Mounting

(continued)

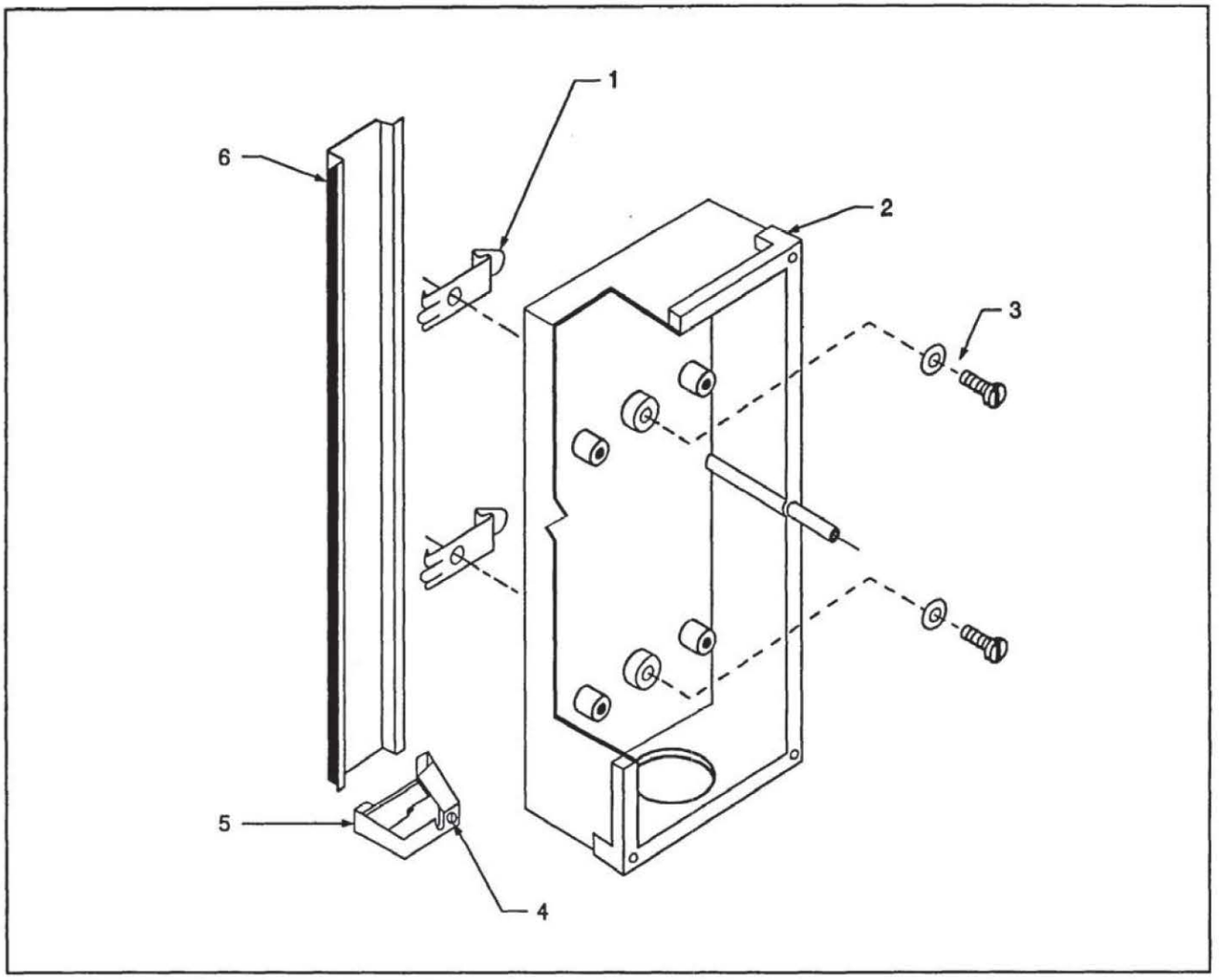


Figure 3.3 - Mounting PC40 to vertical DIN rails

1 – Clip (1 of 2)
2 – Back enclosure
3 – Screw with washer (1 of 2)
4 – Stop screw
5 – End bracket
6 – DIN rail

DIN Rail Mounting

(continued)

Mounting to Horizontal Rails

Make sure that the rails are 6.0 in. (15.24 cm) apart from center to center. Also make sure that the DIN rails are at least 4.0 in. (10.2 cm) in length.

1. Use the two M4 x 12 mm screws to secure the two clips to the back enclosure; make sure that they are oriented for mounting to the horizontal rails (Figure 3.4).

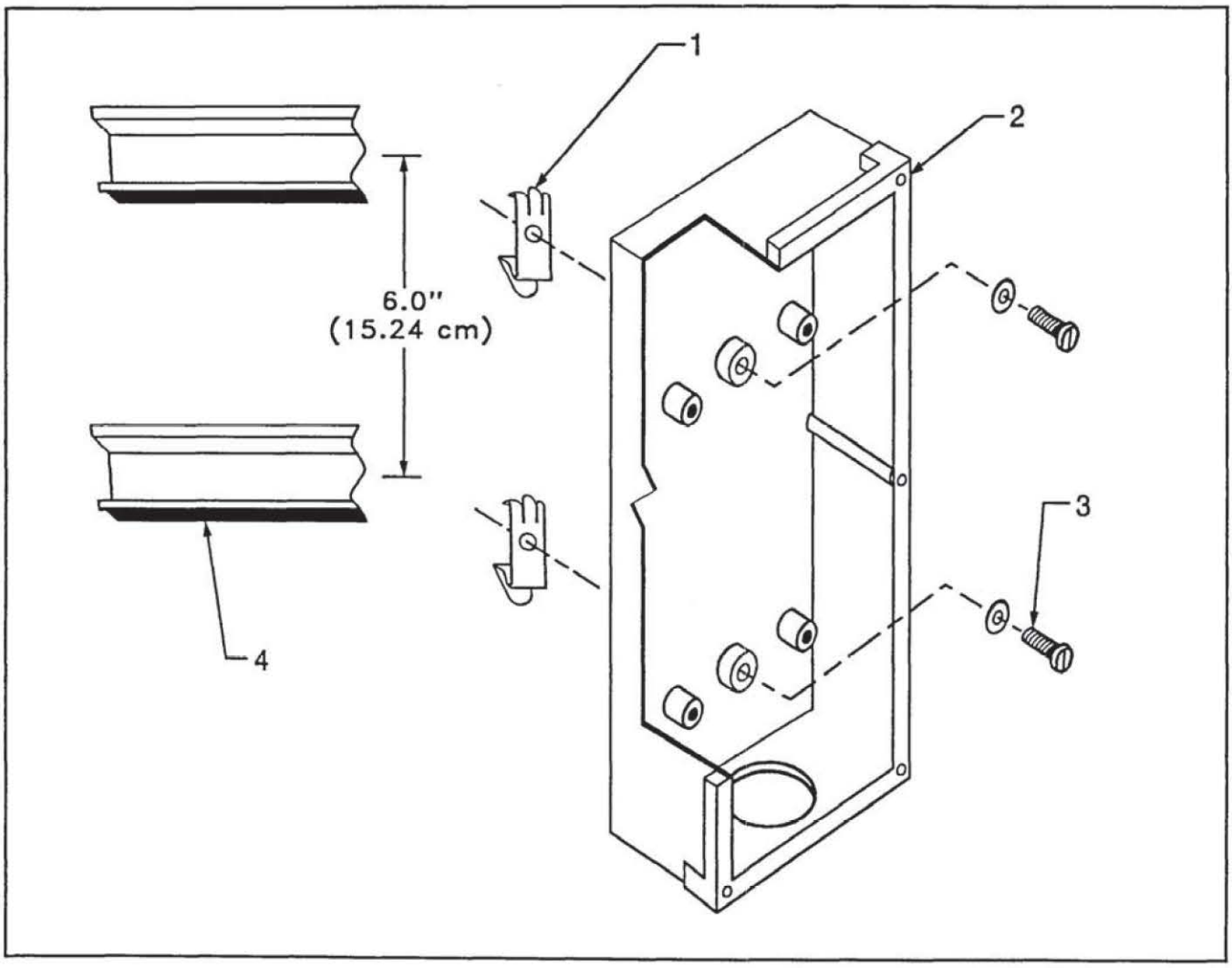


Figure 3.4 - Mounting to horizontal DIN rails

1 – Clip (1 of 2)
2 – Back enclosure
3 – Screw and washer (1 of 2)
4 – DIN rail

2. Fasten the back enclosure to the DIN rail by snapping the clips into the rails.

6. PC40 Electrical Connections

WARNING: Risk of electrocution. The PC40 240 VAC Pattern Control can only be used in geographic regions where 240 VAC with a grounded neutral is the industrial standard. Failure to connect the unit to a grounded neutral can result in personal injury or death. If 120 VAC with a grounded neutral is the industrial standard at your site, consider using either the PC40 AC Pattern Control (P/N 131 712), or the PC40 DC Pattern Control (P/N 131 709) and PS40 DC Power Supply (P/N 131 739).

NOTE: In order to achieve an IP-54 Enclosure Rating (splash-resistant environment), Nordson recommends that you route all PC40 input and output electrical connections through water-tight conduit and a junction box. Use 1 in. (2.5 cm) conduit fitting, and locate the conduit center line 1 in. (2.5 cm) from the wall.

Connecting AC Power to the PC40 240 VAC Unit

1. Install a 1 in. (2.5 cm) diameter strain relief connector (customer supplied) in the PC40 knockout.

2. Temporarily mount the front assembly to the back enclosure by doing the following:

   a. Loosen the six screws on the front assembly.

   b. Remove the two top screws (Figure 3.5).

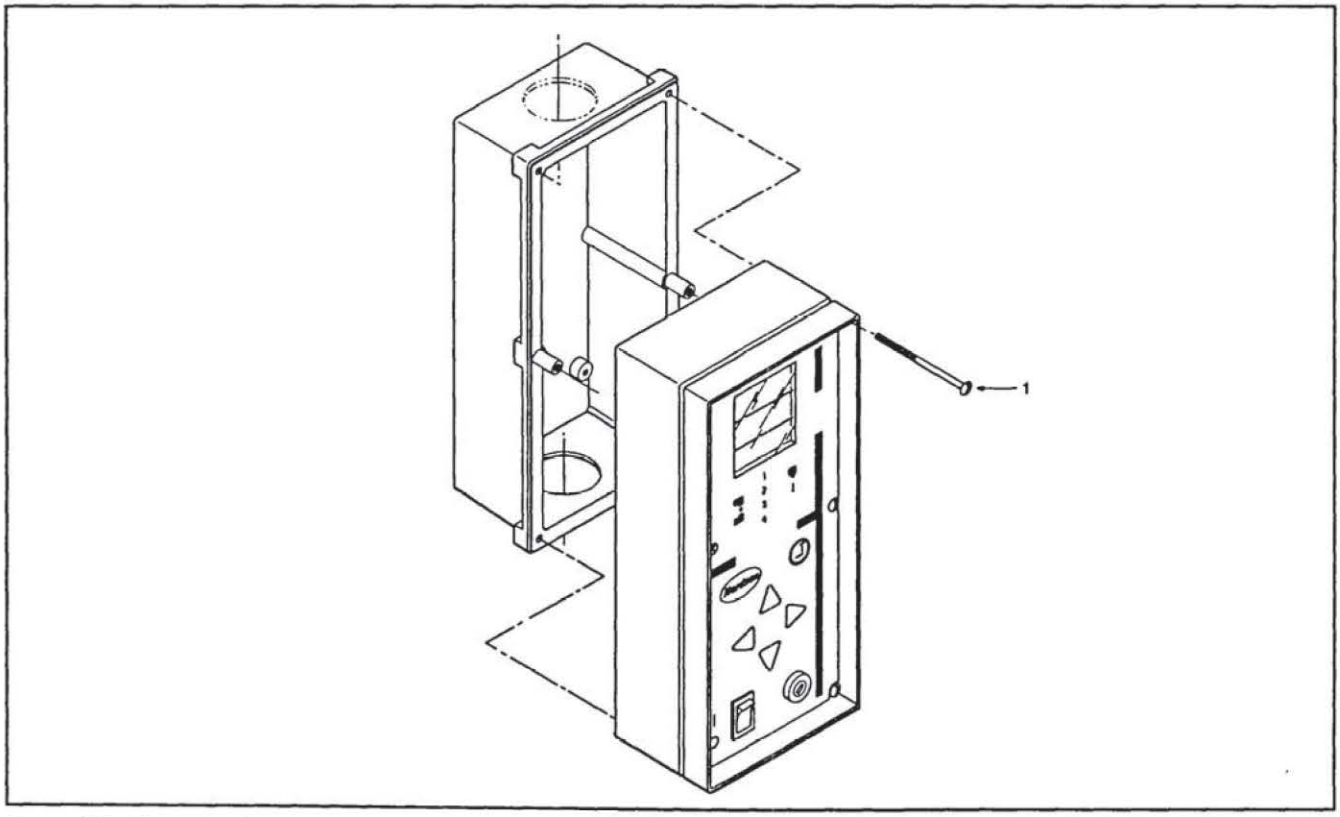


Figure 3.5 - Removing front assembly screws

1 – Screw (1 of 6)

Connecting AC Power to the PC40 AC Unit

(continued)

c. Rotate the front assembly 180° (Figure 3.6).

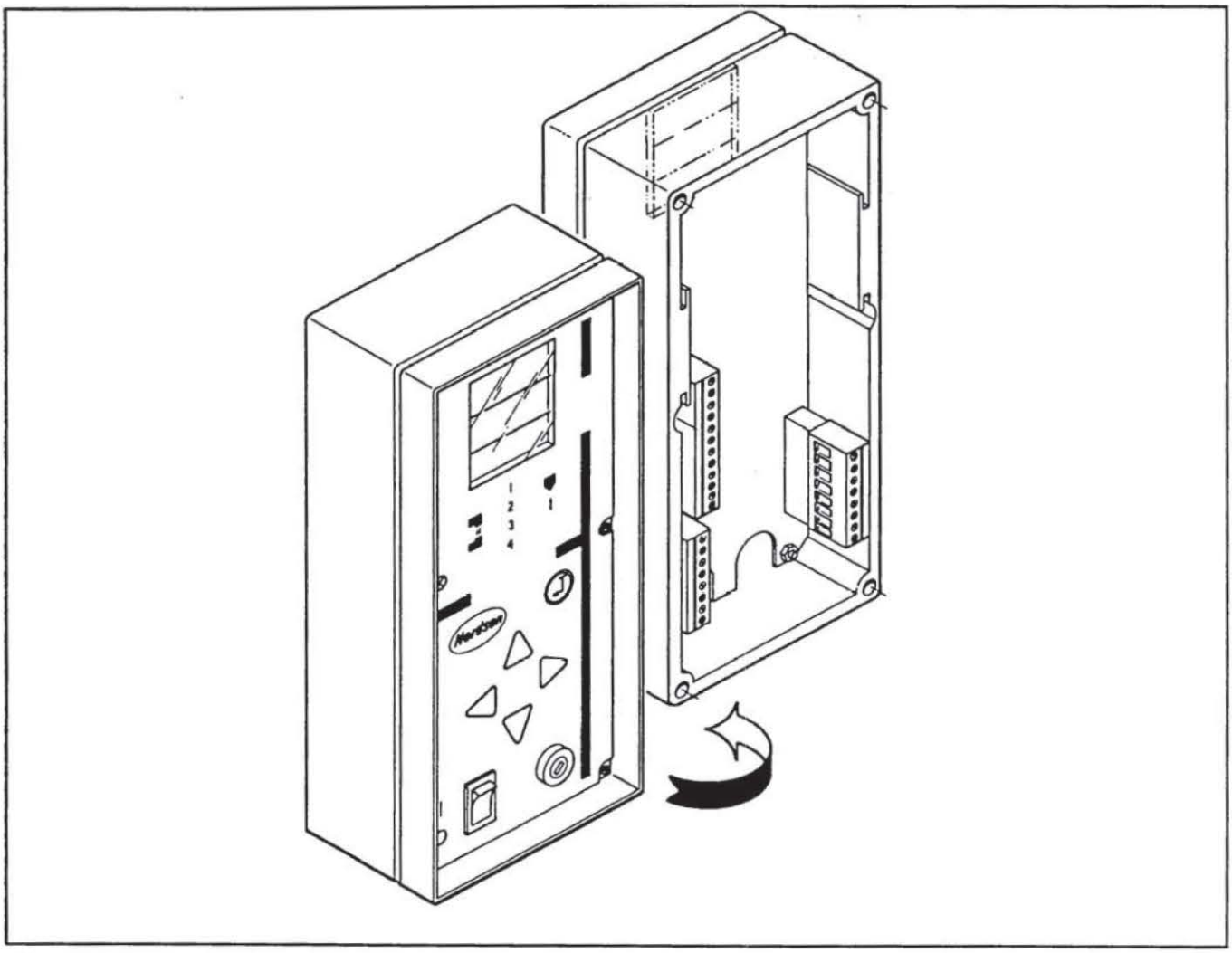


Figure 3.6 - Rotating the front assembly

Connecting AC Power to the PC40 AC Unit

(continued)

d. Push the two screws through the top two front assembly holes (Figure 3.7, view A).

e. Insert the screws into the two back enclosure stand-offs (Figure 3.7, view A).

f. Tighten the two screws to secure the front assembly to the back enclosure (Figure 3.7, view B).

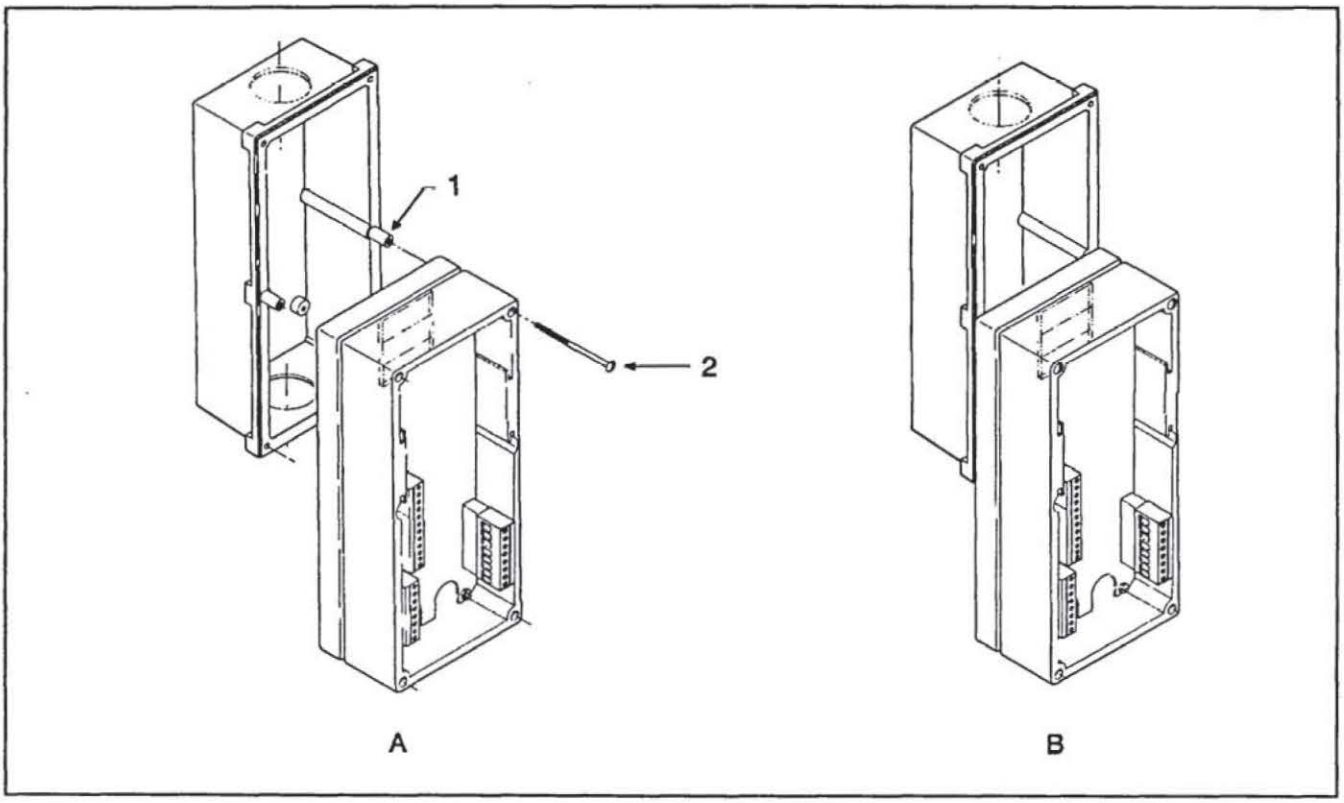


Figure 3.7 - Temporary mounting of front assembly

A – View A
1 – Stand-off (1 of 2)
2 – Screw (1 of 2)
B – View B

Connecting AC Power to the PC40 AC Unit

(continued)

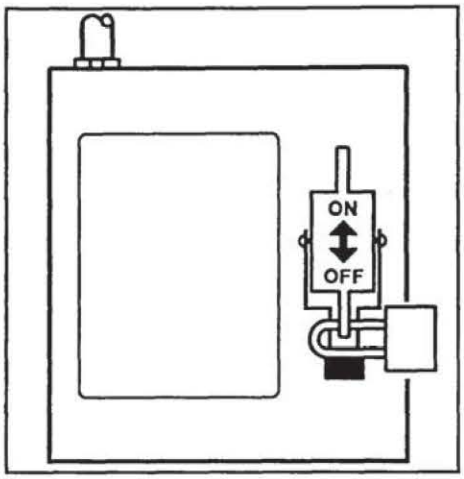


Figure 3.8 - Disconnect and lock out input power

WARNING: Risk of electrocution. The AC input power line to the PC40 provides voltage that can cause personal injury or death. Before making any electrical connections, disconnect and lock out power to the main circuit breaker for the input power line (Figure 3.8).

WARNING: Shock hazard. Touching bare wires in the PC40 can result in shock that can cause personal injury or death. When making electrical connections, make sure to strip only as much insulation from the wires as needed. Also, make sure that the insulation fits snugly against the PC40 terminal blocks.

3. Use 14-16 gauge electrical wire (customer supplied) to make the connections that are listed in Table 3.2. Terminal Block P2 is shown in Figure 3.9.

CAUTION: Reversing the wiring to connections P2-1 (L1) and P2-2 (Neutral) can damage the PC40. If you reverse these connections, the PC40 will only operate properly until the first fault on L1 (to ground). Then, the unit will be damaged, and/or the branch circuit fuse or breaker will blow or trip. Make sure that you wire the AC power connections as listed in the table below.

Table 3.2 - AC Power Connections and Pin Functions

AC Power Line Connection	PC40 Connection Terminal Block P2	Pin Function
Ground	P2-3 ("Safety Ground")	Ground
240 VAC	P2-1 ("240V L1"); refer to the caution, above.	240 VAC input power supply connection
Neutral	P2-2 ("240V Neutral"); refer to the caution, above.	Neutral

4. If you are NOT connecting other devices at this time, do the following:
   a. Grasp the front assembly with one hand. Remove the two screws holding it to the back enclosure.
   b. Carefully rotate the front assembly 180° and place it on the back enclosure.
   c. Replace and tighten the two loose screws.
   d. Tighten the four remaining screws.

Connecting AC Power to the PC40 AC Unit

(continued)

5. If you are connecting other devices at this time, proceed to the appropriate installation procedure(s) in this section.

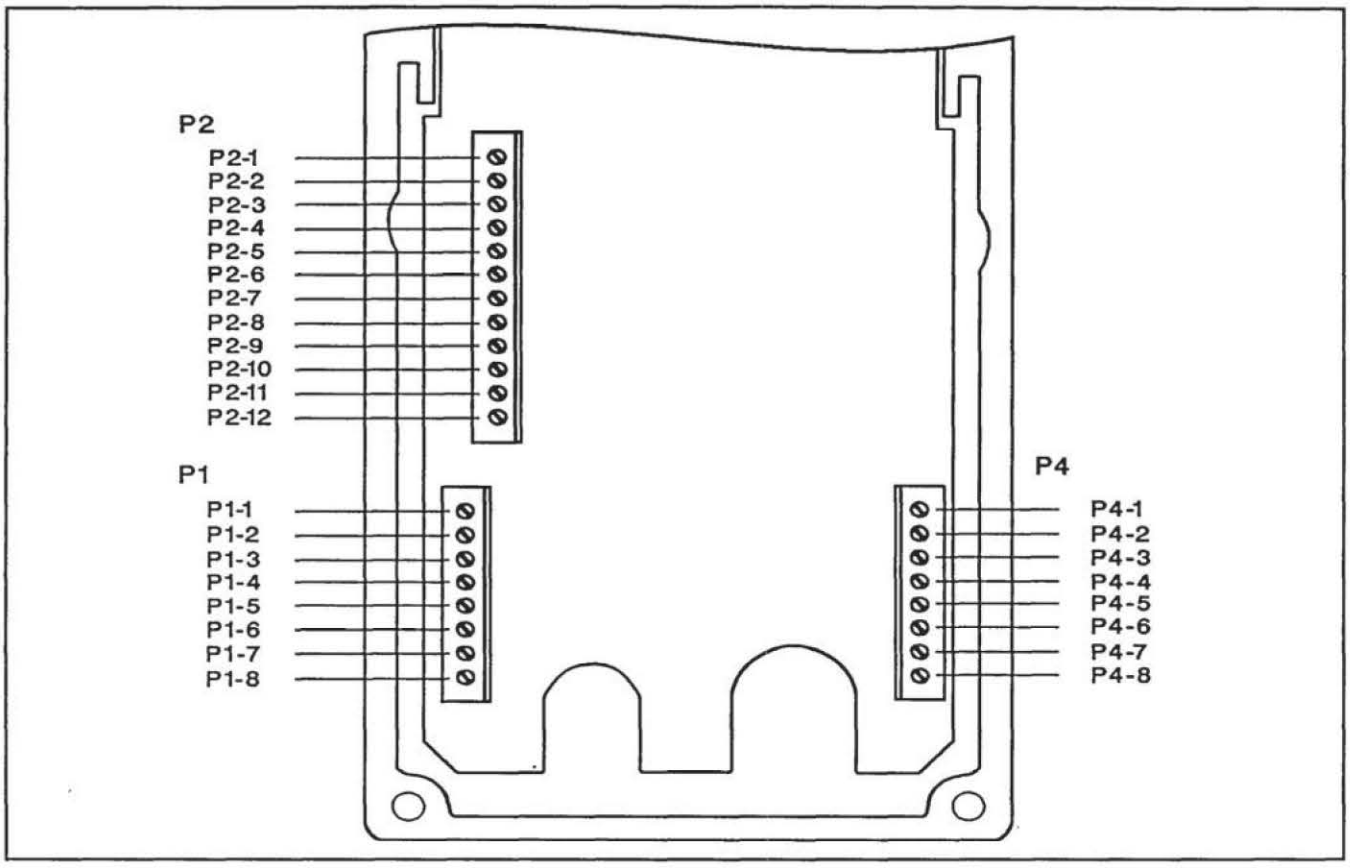


Figure 3.9 - PC40 240 VAC Model terminal block connections

P2 (Power and Outputs):

P2-1 (AC 240V L1)	*P2-7 (Valve 2 Return - Neutral)*
P2-2 (AC 240V Neutral)	*P2-8 (Valve 2)*
P2-3 (AC Safety Ground) (1)	*P2-9 (Valve 3 Return - Neutral)*
P2-4 (NC)	*P2-10 (Valve 3)*
P2-5 (Valve 1 Return - Neutral)	*P2-11 (Valve 4 Return - Neutral)*
P2-6 (Valve 1)	*P2-12 (Valve 4)*

P1 (Remote Control):

P1-1 (Shield)	*P1-5 (Remote Memory Select 3)*
P1-2 (Ground)	*P1-6 (Remote Memory Select 2)*
P1-3 (Common - connect to Ground or +12V)	*P1-7 (Remote Memory Select 1)*
P1-4 (Lock)	*P1-8 (+12V)*

P4 (Trigger Inputs):

P4-1 (+12V)	*P4-5 (+12V)*
P4-2 (Trigger 1)	*P4-6 (Trigger 2)*
P4-3 (Ground)	*P4-7 (Ground)*
P4-4 (Shield)	*P4-8 (Shield)*

(1) Join multiple safety grounds (as from several AC solenoids) with a connector, wire nut, etc. before connecting them to P2-3.

7. Solenoid Wiring Installation

Gun Solenoid Wiring

NOTE: The PC40 240 VAC Pattern Control uses 220/240 VAC solenoids to actuate pneumatic guns. The unit should not be used to actuate electric gun drivers. If you are using electric gun drivers, order the PC40 DC Pattern Control (P/N 131 709) and PS40 DC Power Supply (P/N 131 739).

1. Install the gun solenoid(s) following the instructions provided in the manual you received with your applicator.
2. If you have not already done so, temporarily mount the front assembly to the back enclosure by doing the following:
   a. Loosen the six screws on the front assembly.
   b. Remove the two top screws (Figure 3.5).
   c. Rotate the front assembly 180° (Figure 3.6).
   d. Push the two screws through the top two front assembly holes (Figure 3.7, view A).
   e. Insert the two screws into the two back enclosure stand-offs (Figure 3.7, view A).
   f. Tighten the two screws to secure the front assembly to the back enclosure (Figure 3.7, view B).
3. Route the two leads (three if the solenoid has a ground wire) to the PC40 through water-tight conduit (for an IP-54 enclosure rating) and the strain relief connector.

WARNING: Risk of electrocution. The AC input power line to the PC40 provides voltage that can cause personal injury or death. Before making any electrical connections, disconnect and lock out power to the main circuit breaker for the input power line (see Figure 3.8).

WARNING: Shock hazard. Touching bare wires in the PC40 can result in shock that can cause personal injury or death. When making electrical connections, make sure to strip only as much insulation from the wires as needed. Also, make sure that the insulation fits snugly against the PC40 terminal blocks.

Gun Solenoid Wiring
(continued)

WARNING: Burns. Unexpected gun firing can occur during PC40 installation. The firing can be a response to trigger signals caused by foreign objects blocking the sensors, and by intentional and unintentional triggering that can occur during maintenance. Nordson recommends that you install quick-disconnect solenoid leads. Disconnect the leads during installation to disable the solenoid. Users may want to provide an additional measure of safety by disabling the trigger.

4. Use 16-18 gauge electrical wire (customer supplied) to make the connections shown in Table 3.4. See Figure 3.9 for the location of terminal block P2.

Table 3.4 - Solenoid Pin Connections and Functions

Solenoid Connection[1]	PC40 Terminal Block-Pin Connection	Function
Solenoid #1:		
Ground (if present)	P2-3 ("GROUND") [2]	Solenoid ground
One lead to PC40	P2-5 ("VALVE 1 - RETURN")	Solenoid return connection
One lead to PC40	P2-6 ("VALVE 1")	Solenoid source connection
Solenoid #2:		
Ground (if present)	P2-3 ("GROUND") [2]	Solenoid ground
One lead to PC40	P2-7 ("VALVE 2 - RETURN")	Solenoid return connection
One lead to PC40	P2-8 ("VALVE 2")	Solenoid source connection
Solenoid #3:		
Ground (if present)	P2-3 ("GROUND") [2]	Solenoid ground
One lead to PC40	P2-9 ("VALVE 3 - RETURN")	Solenoid return connection
One lead to PC40	P2-10 ("VALVE 3")	Solenoid source connection
Solenoid #4:		
Ground (if present)	P2-3 ("GROUND") [2]	Solenoid ground
One lead to PC40	P2-11 ("VALVE 4 - RETURN")	Solenoid return connection
One lead to PC40	P2-12 ("VALVE 4")	Solenoid source connection

[1] Some patterns require more than eight transitions. Two channel outputs can be connected in parallel to a solenoid. Then you can program both channels' transition values in sequence for a total of 16 transitions.

[2] If all four solenoid grounds are present, they will not all fit onto P2-3. Connect all the grounds together using a connector, wire nut, etc. before connecting to P2-3.

Gun Solenoid Wiring
(continued)

5. If you are NOT connecting other devices at this time, do the following:

   a. Grasp the front assembly with one hand. Remove the two screws holding it to the back enclosure.

   b. Carefully rotate the front assembly 180° and place it on the back enclosure.

   c. Replace and tighten the two loose screws.

   d. Tighten the four remaining screws.

6. If you are connecting other devices at this time, proceed to the appropriate installation procedure(s) in this section.

8. Trigger (Sensor) Installation

Trigger Input Pin Characterization

The trigger devices, usually photosensors, are connected to PC40 terminal block P4 (refer to Table 3.6 and see Figure 3.9). The signals from the trigger are resistively coupled and filtered into the PC44.

Table 3.6 - Trigger Pin Characterization

Terminal Block-Pin Connection	Function
Trigger #1	
P4-1 ("+12V")	DC power for first trigger. Maximum current available from +12 V is 500 mA. This is the maximum current available for all connections to +12 V including those loads on other PC40 connectors.
P4-2 ("TRIGGER 1")	Input signal from first trigger.
P4-3 ("GROUND")	Ground connection for first trigger.
P4-4 ("SHIELD")	Shield connection for first trigger.
Trigger #2 (if used),	
P4-5 ("+12V")	DC power for second trigger. Maximum current available from +12 V is 500 mA. This is the maximum current available for all connections to +12 V including those loads on other PC40 connectors.
P4-6 ("TRIGGER 2")	Input signal from second trigger.
P4-7 ("GROUND")	Ground for second trigger.
P4-8 ("SHIELD")	Shield connection for second trigger.

Current Sinking (NPN) Requirements

A current sinking (NPN) device capable of sinking at least 10 mA must be used to stimulate the signal inputs. The internal circuitry for the Nordson photosensor is pre-wired to include the required NPN switching element. Figure 3.10 shows the wiring diagram for the Nordson photosensor.

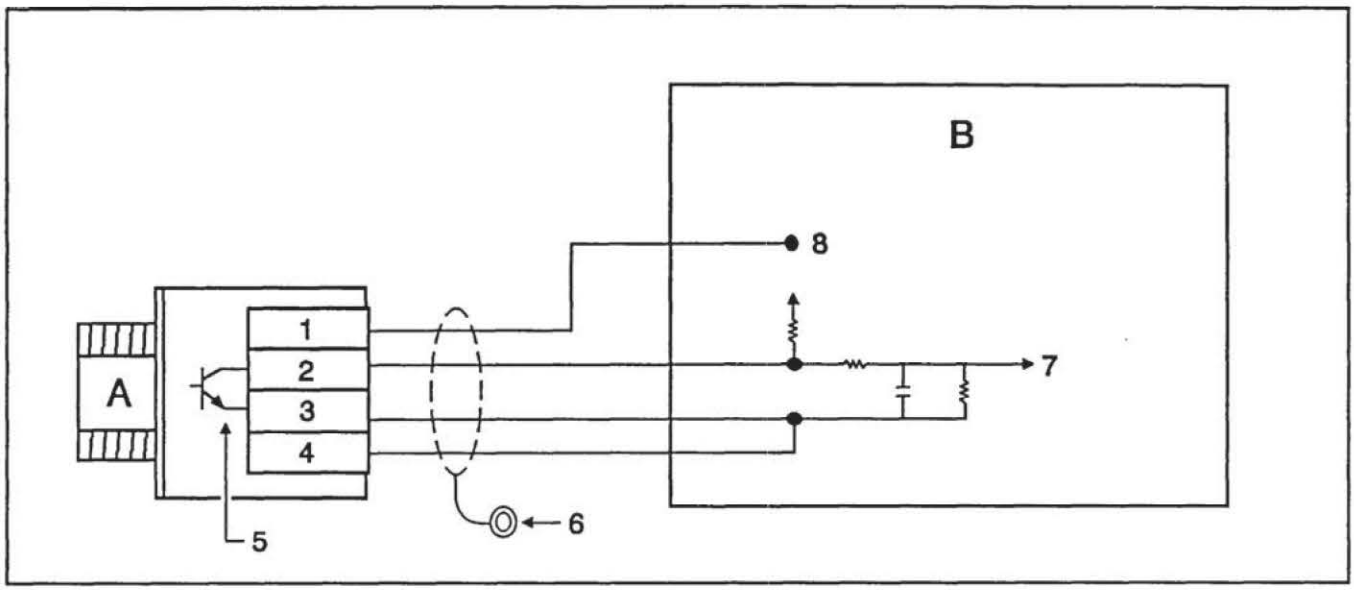


Figure 3.10 - Nordson photosensor wiring diagram (wired as a sinking device)

A – Photosensor
1 – +12VDC
2 – Signal
3 – Ground
4 – Shield
5 – Switching element (NPN transistor), pre-wired within sensor circuitry
6 – Pigtail wire for shield

B – PC40
7 – To logic circuit
8 – +12V

Tips for Minimizing Unwanted Triggering

The occurence of unwanted trigger signals can be reduced by following these recommendations:

- Avoid routing sensor wires near AC power lines, solenoid output lines, or other electrical devices (i.e., motors, contactors, relays, etc.) that may cause electrical interference. Especially avoid routing wires in troughs or conduits with other high current-carrying conductors.
- Make sure that no objects other than the substrate pass between the sensor and substrate during line operation.
- Mount the sensors within the recommended distance range of the substrate.

Tips for Minimizing Unwanted Triggering

(continued)

- Mount the sensor to metal that is connected to earth safety ground (system ground).
- Adjust photosensor gain to the minimum required sensitivity. This will reduce both electrical and optical problems.
- The photosensor cable shield should be grounded at both ends. This will reduce the effects of electrical noise produced by contactors, motors, and arc-welders.
- Through-beam and retroreflective photosensors should be used in the light operate mode. This also will reduce the effects of electrical noise.
- Diffuse reflective photosensors should be used in the dark operate mode. This will reduce the effects of electrical noise.

Mounting Dimensions

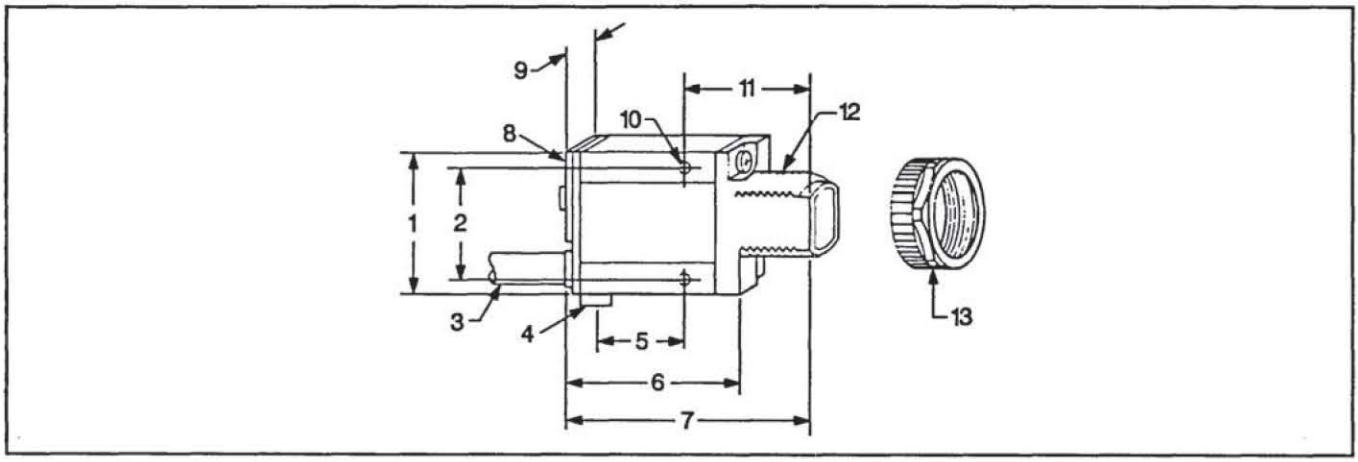


Figure 3.11 - Sensor dimensions

1 – 1.21 in. (30.7 mm)
2 – 0.95 in. (24.1 mm)
3 – 30 ft (9.1 m)
4 – Mounting peg; 0.25 in. diameter x 0.10 in. (6.4 mm diameter x 2.5 mm)
5 – 0.75 in (19.1 mm)
6 – 1.5 in. (38.1 mm)
7 – 2.1 in. (53.3 mm)
8 – Gasketed, acrylic cover
9 – 0.48 in. (12.2 mm)
10 – #4 screw clearance (2 places)
11 – 1.08 in. (27.4 mm)
12 – 0.71in. (18 mm) diameter; 18 x 1 mm thread
13 – Mounting nut (supplied), 0.95 in. (24.1 mm) diameter

Mounting Dimensions

(continued)

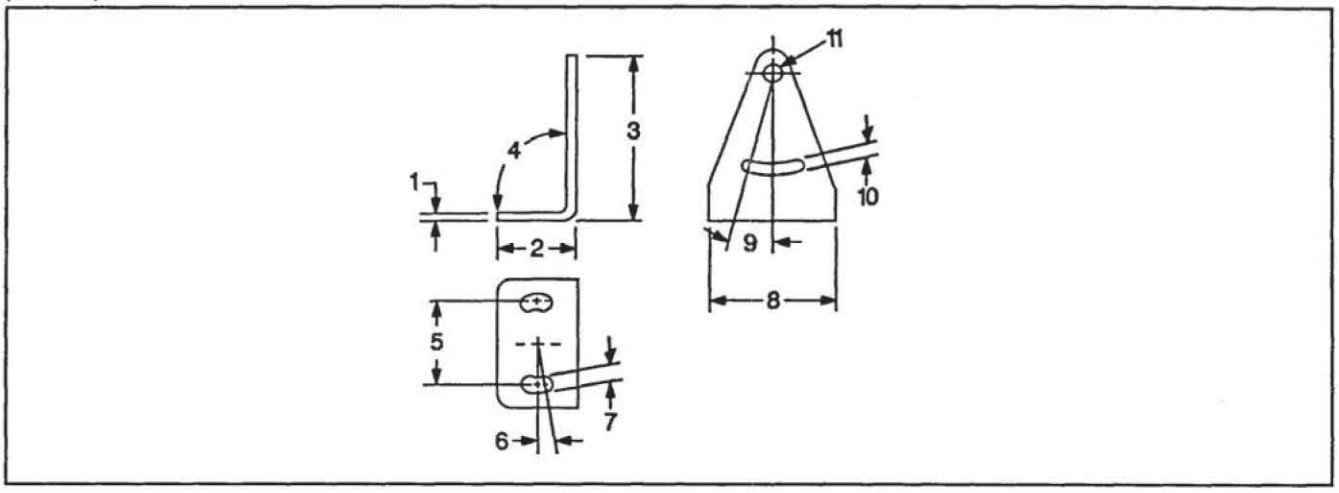


Figure 3.12 - Sensor bracket dimensions

1 – 0.10 in. (2.5 mm)
2 – 0.79 in. (20.1 mm)
3 – 1.79 in. (45.5 mm)
4 – 90 degrees
5 – 0.80 in. (20.3 mm)
6 – 10 degrees (typically)
7 – 0.170 in. (4.3 mm); 2 slots
8 – 1.25 in. (31.8 mm)
9 – 15 degrees (either direction)
10 – 0.120 in. (3.1 mm)
11 – 0.120 in. (3.1 mm)

Mounting Nordson Sensors

1. If you have not already done so, temporarily mount the PC40 front assembly to the back enclosure by doing the following:
   a. Loosen the six screws on the front assembly.
   b. Remove the two top screws (Figure 3.5).
   c. Rotate the front assembly 180° (Figure 3.6).
   d. Push the two screws through the top two front assembly holes (Figure 3.7, view A).
   e. Insert the two screws into the two back enclosure stand-offs (Figure 3.7, view A).
   f. Tighten the two screws to secure the front assembly to the back enclosure (Figure 3.7, view B).
2. Check the intended mounting position to make sure that there enough space to mount the sensor(s) and bracket(s). See Figure 3.11, Figure 3.12 and Figure 3.13.
3. Proceed to the instructions for mounting the type of sensor that you are using.

Mounting Diffuse Sensors

1. Check the intended mounting position to ensure that there is enough space to mount the sensor(s) and bracket(s). See Figure 3.11, Figure 3.12, and Figure 3.13.
2. Check the intended mounting position to make sure that there are no objects other than the substrate that will pass between the sensor and substrate during line operation.

Mounting Nordson Sensors
(continued)

3. Locate the sensor bracket so that the sensor is no closer than 2 in. (5.1 cm) nor further than 15 in. (38.1 cm) from the substrate.

4. Securely connect the sensor bracket to the mounting surface. Excessive movement or vibration can result in intermittent or false operation caused by loss of alignment to the substrate.

5. Using the two mounting bolts provided with the sensor bracket, secure the sensor to the bracket (Figure 3.13).

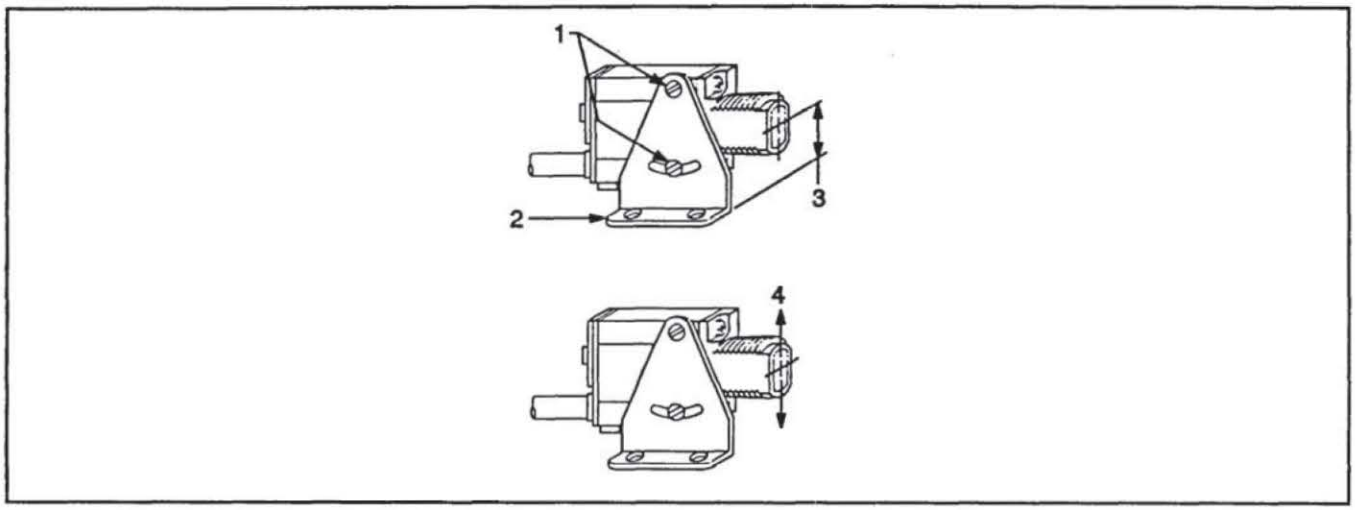


Figure 3.13 - Connecting the sensor and bracket

1 – #4 mounting bolts (2 supplied)
2 – Bracket
3 –Lens centerline, 1.12 in. (28.5 mm)
4 – Front of sensor tilts vertically
+/– 15 degrees from horizontal

6. Route the sensor leads through water-tight conduit (for an IP-54 enclosure rating) and the strain relief connector and into the PC40.

7. Skip to "Nordson Photosensor Wiring Connections."

Mounting Nordson Sensors

(continued)

Mounting Opposed Sensors

NOTE: To avoid unwanted trigger signals, make sure that there are no objects other than the substrate that pass between the emitter and receiver during line operation. Also, make sure that the emitter and receiver are mounted no more than 10 ft (3 m) from each other.

1. Check the intended mounting position to ensure that there is enough space to mount the sensor(s) and bracket(s). See Figure 3.11, Figure 3.12, and Figure 3.13
2. Check the intended mounting position to make sure that there are no objects other than the substrate that will pass between the sensor and substrate during line operation.
3. Locate the emitter bracket so that the emitter is no further than 10 ft (304.8 cm) from the substrate.
4. Securely connect the emitter bracket to the mounting surface. Excessive movement or vibration can result in intermittent or false operation caused by loss of alignment to the substrate.
5. Securely connect the receiver bracket to the mounting surface.
6. Using the two mounting bolts provided with the brackets, secure the emitter and receiver to their respective brackets (Figure 3.13).
7. Route the sensor leads through water-tight conduit (for an IP-54 enclosure rating) and the strain relief connector and into the PC40.
8. Skip to "Nordson Photosensor Wiring Connections."

Mounting Nordson Sensors
(continued)

Mounting Retroreflective Sensors

NOTE: To avoid unwanted trigger signals, make sure that there are no objects other than the substrate that pass between the emitter/receiver and the reflector during line operation.

NOTE: Make sure that the emitter/receiver and reflector are mounted no more than 7 ft (2.13 m) from each other (polarized model) or no more than 15 ft (4.5 m) from each other (non-polarized model).

1. Check the intended mounting position to ensure that there is enough space to mount the sensor(s) and bracket(s). See Figure 3.11, Figure 3.12, and Figure 3.13
2. Check the intended mounting position to make sure that there are no objects other than the substrate that will pass between the sensor and substrate during line operation.
3. Locate the emitter/receiver bracket so that it is no further from the reflector than
   a. 7 ft (2.13 m) for the polarized model, or
   b. 15 ft (4.5 m) for the non-polarized model.
4. Securely connect the emitter/receiver bracket to the mounting surface. Excessive movement or vibration can result in intermittent or false operation caused by loss of alignment to the substrate.
5. Using the two mounting bolts provided with the bracket, secure the emitter/receiver to the bracket (Figure 3.13).
6. Secure the reflector to the mounting surface opposite the emitter/receiver.
7. Route the sensor leads through water-tight conduit (for an IP-54 enclosure rating) and the strain relief connector and into the PC40.
8. Skip to "Nordson Photosensor Wiring Connections."

Nordson Photosensor Wiring Connections

WARNING: Risk of electrocution. The AC input power line to the PC40 provides voltage that can cause personal injury or death. Before making any electrical connections, disconnect and lock out power to the main circuit breaker for the input power line (see Figure 3.8).

1. Connect the wires for each photosensor as indicated in Table 3.7 or Table 3.8. See Figure 3.9 for the location of terminal block P4.

Table 3.7 - Nordson Photosensor Wire Connections (except Through-beam Emitter, P/N 131 473)

Wire Color	Function	Trigger #1 Connection	Trigger #2 (if used) Terminal Connection
Red	+VDC	P4-1 ("+12V")	P4-5 ("+12V")
Green	Sourcing output	None; clip lead.	None; clip lead.
White	Sinking output	P4-2 ("TRIGGER 1")	P4-6 ("TRIGGER 2")
Black	Common	P4-3 ("GROUND")	P4-7 ("GROUND")

Table 3.8 - Nordson Through-beam Emitter, P/N 131 473 Wire Color Code

Wire Color	Function	Trigger #1 Terminal Connection	Trigger #2 (if used) Terminal Connection
Brown	+VDC	P4-1 ("+12V")	P4-5 ("+12V")
Blue	Common	P4-3 ("GROUND")	P4-7 ("GROUND")

2. Ground the other end of each photosensor shield near the sensor.
3. If you are NOT connecting remote devices at this time, do the following:
   a. Grasp the front assembly with one hand. Remove the two screws holding it to the back enclosure.
   b. Carefully rotate the front assembly 180° and place it on the back enclosure.
   c. Replace and tighten the two loose screws.
   d. Tighten the four remaining screws.
4. Align the sensors by following the instructions that follow.

Aligning Sensors

Alignment Indicator

Nordson photosensors have an alignment indicator (LED). The LED pulse (flash) rate increases as alignment improves. The sensor is adjusted so that the LED is off (not flashing) in the dark condition or is on (flashing) at a fast rate in the light condition.

The LED flash rate also indicates when sensor maintenance is needed. Whenever the flash rate is slow, the sensor's lenses should be cleaned and the alignment checked.

Proceed to the instructions for aligning the type of sensor that you are using.

Aligning Diffuse Reflective (Proximity) Sensors

NOTE: Before adjusting the gain control, make sure that any background objects (e.g., moving machine parts which would pass through the sensor's field of view during operation) are present in the sensor's line of sight during adjustment.

1. Remove the gasketed acrylic cover located above the sensor electrical cable.
2. Turn on power to the sensor.
3. Direct the infrared sensor light beam at the substrate and observe the red alignment LED (Figure 3.14).
4. Turn the gain control until the LED is flashing on and off.
5. Move the substrate and, if possible, any background objects out of the sensor's field of view. If the LED stays off, no further adjustment is necessary.

NOTE: The gain control is a 15-turn pot which does not have a stop position. The gain control ratchets at the end of its travel.

6. If the LED remains on, turn the gain control counterclockwise by ½ turn increments until the sensor comes on only when it "sees" the substrate, but goes off when the substrate is removed. If the LED still remains on after you turn the gain control fully counterclockwise, remount the sensor further from the substrate (but no further away than 15 in. or 38.1 cm).
7. If you are connecting other devices at this time, proceed to the appropriate installation procedure(s) in this section.

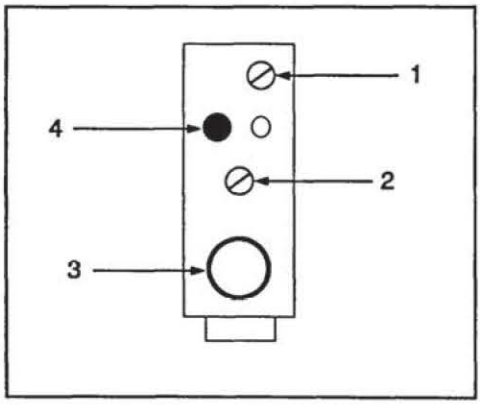


Figure 3.14 - Alignment LED and gain control locations

1 – Gain control
2 – Light/dark operate switch
3 – Cable opening
4 – Alignment LED

Aligning Sensors

(continued)

Aligning Opposed (Through Beam) Sensors

1. Remove the gasketed acrylic cover located above the sensor electrical cable.
2. Turn on power to the sensor.
3. Direct the emitter at the receiver and observe the red alignment LED on the receiver (Figure 3.14).
4. Turn the gain control to the fully clockwise position. The LED should be flashing on and off.
5. Adjust the position of the emitter and/or receiver to achieve the maximum alignment LED flash rate.
6. Move the substrate between the emitter and receiver. If the LED stays off, no further adjustment is necessary.
7. If the LED continues to flash on and off, or remains on, turn the gain control counterclockwise by ½ turn increments until the LED goes out and stays off.
8. If you are connecting other devices at this time, proceed to the appropriate installation procedure(s) in this section.

Aligning Retroreflective Sensors

1. Remove the gasketed acrylic cover located above the sensor electrical cable.
2. Turn on power to the sensor.
3. Direct the infrared light beam on the emitter/receiver at the reflector and observe the red alignment LED (Figure 3.14).
4. Turn the gain control to the fully clockwise position. The LED should be flashing on and off.
5. Move the substrate between the emitter/receiver and reflector. If the LED stays off, no further adjustment is necessary.
6. If the LED continues to flash on and off, or remains on, turn the gain control counterclockwise by ½ turn increments until the LED goes out and stays off. If the LED still remains on after you turn the gain control fully counterclockwise, take steps to reduce the reflectivity of the substrate.
7. If you are connecting other devices at this time, proceed to the appropriate installation procedure(s) in this section.

9. PC40 Remote Communications Installation

The following information is provided if you will be using a remote device to select active memory and/or lock out input through the PC40 user interface.

Remote connections are made to PC40 terminal block P1 (Figure 3.9). Signals connected to P1 are optically isolated from the remote system. The opto-isolators can be turned on by either current sourcing or current sinking devices.

Remote Pin Characterization

Table 3.9 - Remote Communication Pin Characterization

Pin	Function	Comments
P1-1 ("Shield")	Provided for field wiring convenience.	Connected to the remote device I/O printed circuit board.
P1-2 ("Ground")	Provided for field wiring convenience.	Connected to the remote device I/O printed circuit board.
P1-3 ("Common")	Provides for one half of the connection for all of the opto-isolators.	For sourcing (PNP) devices, P1-3 should be connected to P1-2 ("Ground"). For sinking (NPN) devices, P1-3 should be connected to P1-8 ("+12V").
P1-4 ("Lock")	Provides for a remote signal to disallow access to the PC40 Program Mode.	
P1-5 ("Remote Memory Select 3")	Provides connection to allow a remote device to change the active memory.	
P1-6 ("Remote Memory Select 2")	Provides connection to allow a remote device to change the active memory.	
P1-7 ("Remote Memory Select 1")	Provides connection to allow a remote device to change the active memory.	
P1-8 ("+12V")	Provides 12 VDC input power for any remote device that requires it.	Maximum current available from pin P1-8 is 500 mA.This is the maximum current available for all connections to pin P1-8 including loads on other PC40 connectors.

Remote Memory Selection and Memory Logic

The logic levels should be held continuously. Remote selection will take place after the levels have been there for at least 500 ms.

If you try to select a non-configured memory, the current memory remains in effect and the PC40 status LED will light red. The LED will stay on until you select a configured memory or configure the memory you were attempting to select.

When the PC40 senses a remote memory selection, the unit checks to see if any patterns are in progress. If no patterns are in progress, the memory change will take place. However, if a pattern is in progress, the memory change will be inhibited until all patterns are completed.

Table 3.10 shows the logic that is used to select a memory. Logic OFF or ON refers to the state of the device connected to PC40 terminal block P1 (pins 5, 6, and 7). The device can be NPN or PNP depending on how P1-3 is wired (refer to the comments for P1-3 in Table 3.9).

Table 3.10 - Remote Memory Select Logic

Selection	P1-5	P1-6	P1-7
Remote Disabled	Off	Off	Off
Memory A	Off	Off	On
Memory B	Off	On	Off
Memory C	Off	On	On
Memory D	On	Off	Off
For Future Use	On	Off	On
For Future Use	On	On	Off
For Future Use	On	On	On

Remote Memory Select Switch Installation

NOTE: This switch is not intended to be installed in the PC40. It can be mounted on a remote panel, etc.

The Nordson Remote Memory Select Switch is a 4-position, rotary switch that enables you to remotely select which PC40 memory is active.

1. Secure the switch to the mounting surface.
2. If you have not already done so, temporarily mount the front assembly to the back enclosure by doing the following:
   a. Loosen the six screws on the front assembly.
   b. Remove the two top screws (Figure 3.5).
   c. Rotate the front assembly 180° (Figure 3.6).
   d. Push the two screws through the top two front assembly holes (Figure 3.7, view A).
   e. Insert the two screws into the two back enclosure stand-offs (Figure 3.7, view A.)

Remote Memory Select Switch Installation

(continued)

f. Tighten the two screws to secure the front assembly to the back enclosure (Figure 3.7, View B).

WARNING: Risk of electrocution. The AC input power line to the PC40 240 VAC power supply) provides voltage that can cause personal injury or death. Before making any electrical connections, disconnect and lock out power to the main circuit breaker for the input power line (see Figure 3.8).

WARNING: Shock hazard. Touching bare wires in the PC40 can result in shock that can cause personal injury or death. When making electrical connections, make sure to strip only as much insulation from the wires as needed. Also, make sure that the insulation fits snugly against the PC40 terminal blocks.

3. Use 18-22 gauge wire (customer supplied) to make the switch and PC40 jumper wire connections shown in Figure 3.15.

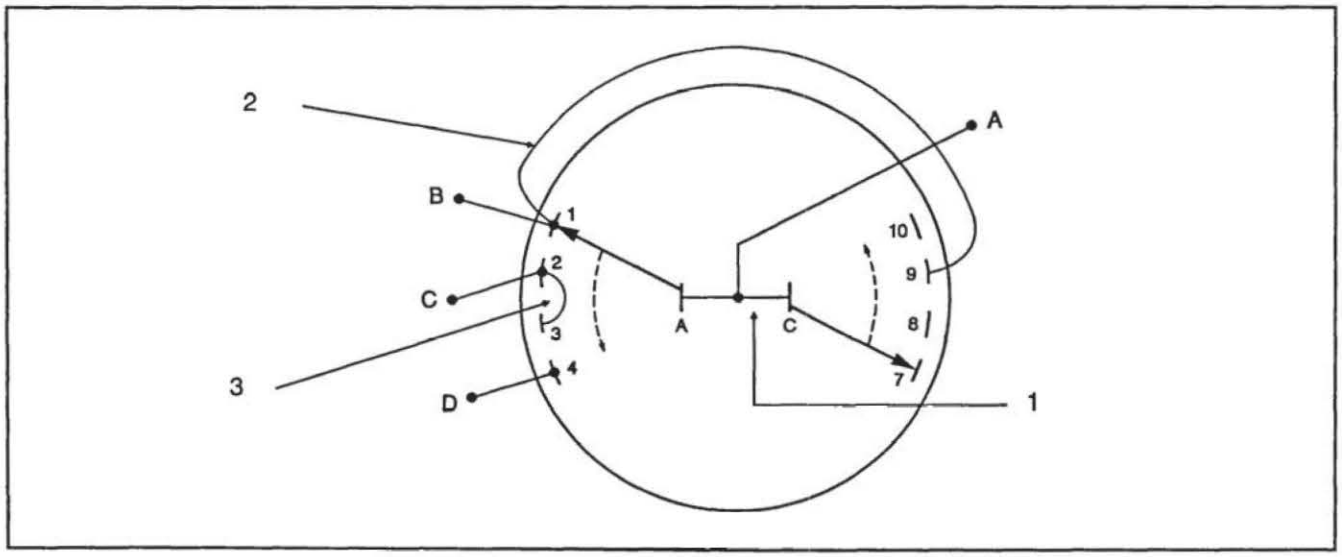


Figure 3.15 - Memory select switch (rear view) jumper connections

1 – Jumper #1
2 – Jumper #2
3 – Jumper #3

Remote Memory Select Switch Installation
(continued)

NOTE: When both the Rotary Select Switch and Keyed Lock Out Switch are installed, both must be connected as either sourcing devices or as sinking devices. Figure 3.16 shows the wiring for the Rotary Select Switch as a sourcing device. Figure 3.17 shows the wiring for the switch as a sinking device.

4. Make the Rotary Select Switch to PC40 connections by doing one of the following:
   - **Switch Used as a Sourcing Device -** Use an 18-22 gauge wire (customer supplied) to make the connections shown in Figure 3.16. Make sure to install the jumper from PC40 connection P1-2 to P1-3.

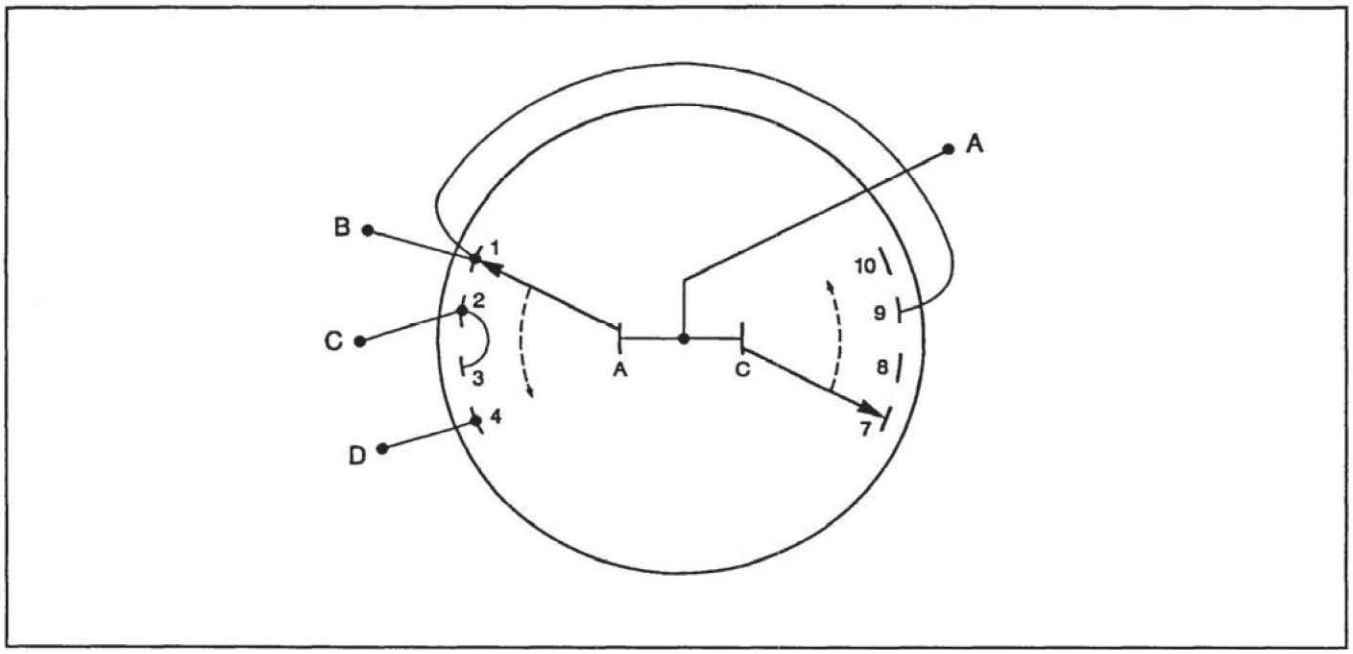


Figure 3.16 - Current sourcing remote memory switch (rear view)

A – P1-8 ("+12V"); also, install jumper from PC40 connection P1-2 to P1-3
B – P1-7 ("Remote Memory Select 1")
C – P1-6 ("Remote Memory Select 2")
D – P1-5 ("Remote Memory Select 3")

Remote Memory Select Switch Installation

(continued)

Switch Used as a Sinking Device

Use an 18-22 gauge wire (customer supplied) to make the connections shown in Figure 3.17. Make sure to install the jumper from PC40 connection P1-3 to P1-8.

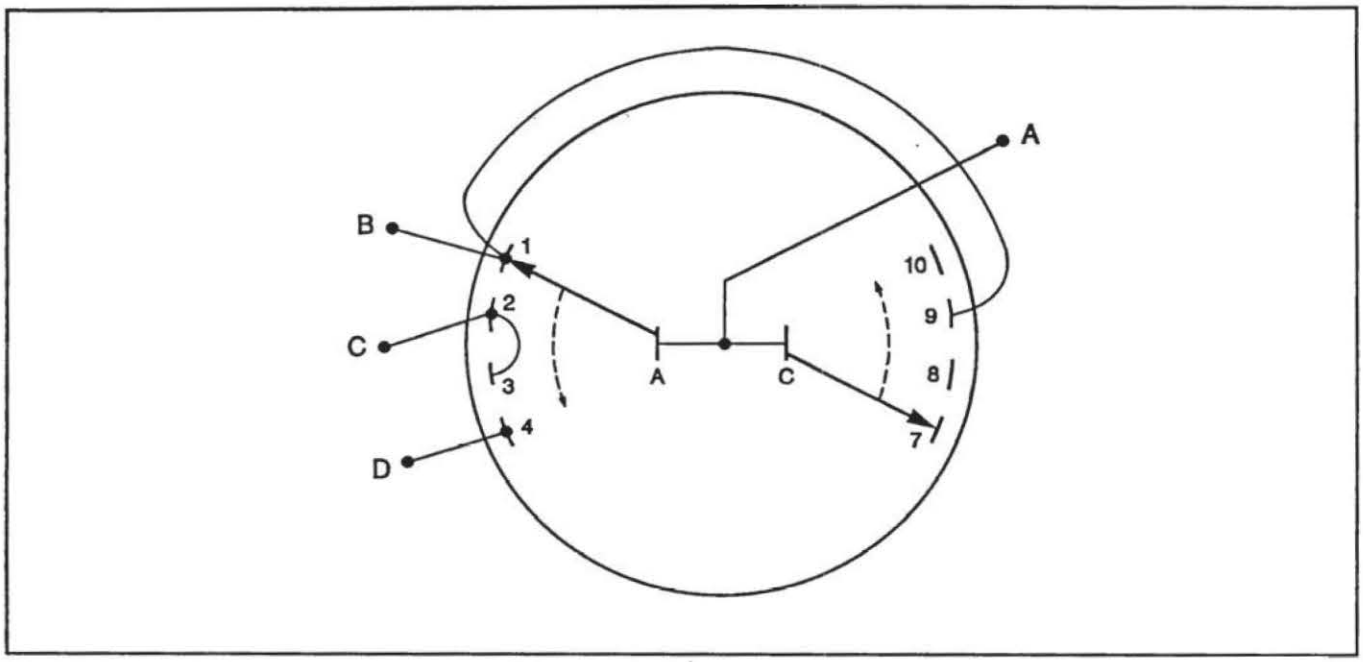


Figure 3.17 - Current sinking remote memory switch (rear view)

A – P1-2 ("Ground"); also, install jumper from PC40 connection P1-3 to P1-8
B – P1-7 ("Remote Memory Select 1")
C – P1-6 ("Remote Memory Select 2")
D. - P1-5 ("Remote Memory Select 3")"

5. If you are NOT connecting other devices at this time, do the following:
   a. Grasp the front assembly with one hand. Remove the two screws holding it to the back enclosure.
   b. Carefully rotate the front assembly 180° and place it on the back enclosure.
   c. Replace and tighten the two loose screws.
   d. Tighten the four remaining screws.
6. If you are connecting other devices at this time, proceed to the appropriate installation procedure(s) in this section.

Keyed Lock Out Switch Installation

NOTE: This switch is not intended to be installed in the PC40. It can be mounted on a remote panel, etc.

The Nordson Keyed Lock Out Switch is an A-lock type, 4-tumbler switch that prevents any input via the PC40 user interface.

NOTE: When both the Keyed Lock Out Switch and Rotary Select Switch are installed, both must be connected as either sourcing devices or as sinking devices. Figure 3.18 shows the wiring for the Keyed Lock Out Switch as a sourcing device. Figure 3.19 shows the wiring for the switch as a sinking device.

1. Secure the switch to the mounting surface.
2. If you have not already done so, temporarily mount the front assembly to the back enclosure by doing the following:
   a. Loosen the six screws on the front assembly.
   b. Remove the two top screws (Figure 3.5).
   c. Rotate the front assembly 180° (Figure 3.6).
   d. Push the two screws through the top two front assembly holes (Figure 3.7, view A).
   e. Insert the two screws into the two back enclosure stand-offs (Figure 3.7, view A).
   f. Tighten the two screws to secure the front assembly to the back enclosure (Figure 3.7, view B).

WARNING: Risk of electrocution. The AC input power line to the PC40 provides voltage that can cause personal injury or death. Before making any electrical connections, disconnect and lock out power to the main circuit breaker for the input power line (Figure 3.8).

WARNING: Shock hazard. Touching bare wires in the PC40 can result in shock that can cause personal injury or death. When making electrical connections, make sure to strip only as much insulation from the wires as needed. Also, make sure that the insulation fits snugly against the PC40 terminal blocks.

Keyed Lock Out Switch Installation
(continued)

3. Use 18-22 gauge wire (customer supplied) to make the switch and PC40 jumper wire connections by doing one of the following

   - **Switch Used as a Sourcing Device -** Use an 18-22 gauge wire (customer supplied) to make the connections shown in Figure 3.18. Make sure to install the jumper from PC40 connection P1-2 to P1-3.

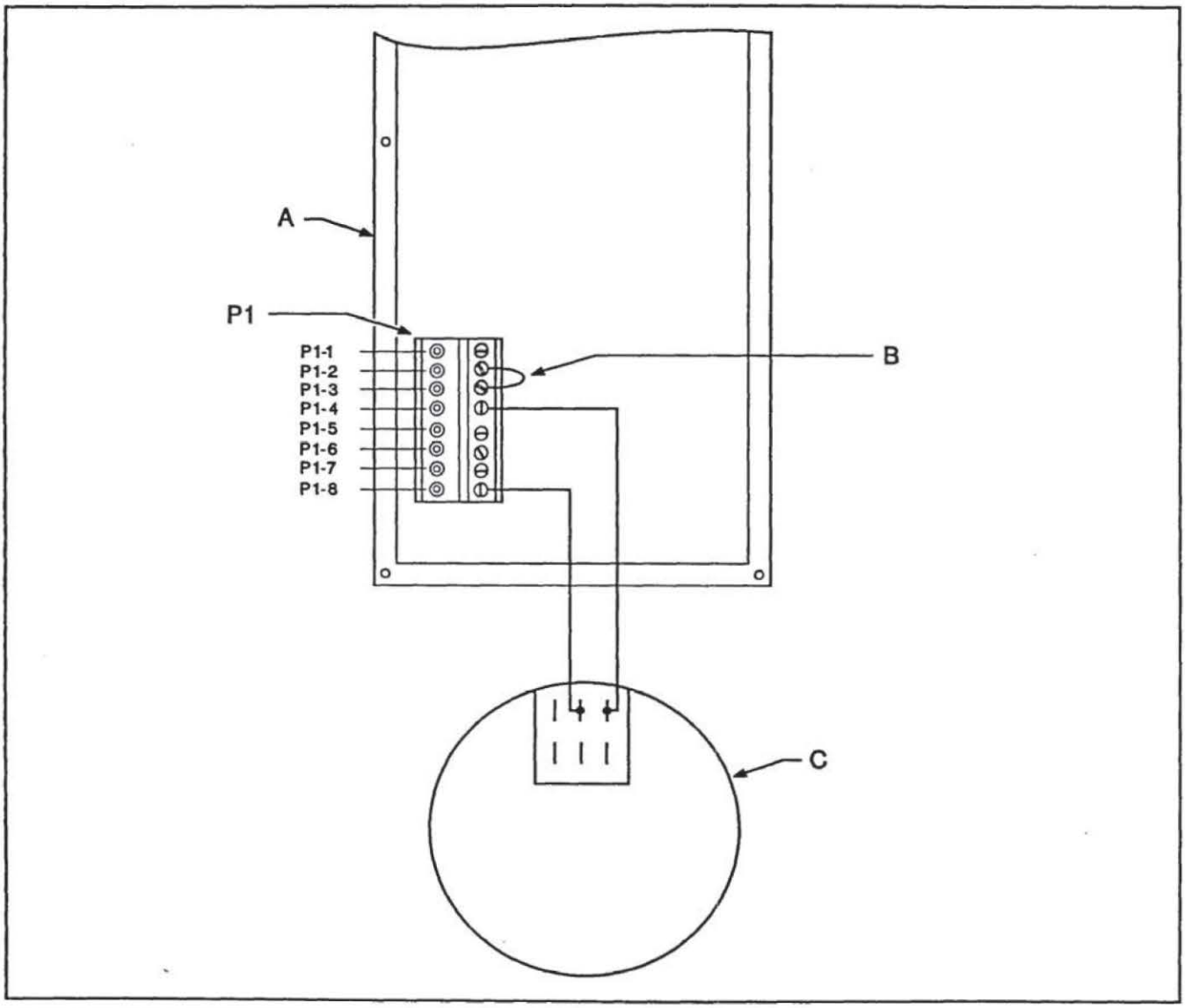


Figure 3.18 - Current sourcing keyed lock out switch

A – Front assembly (rear view)
B – Install jumper wire
C – Keyed lock out switch (rear view)
P1 ("Remote Control"):
P1-2 ("Ground)
P1-3 ("Common")
P1-4 ("Lock")
P1-8 ("+12V")

Keyed Lock Out Switch Installation

(continued)

- **Switch Used as a Sinking Device -** Use an 18-22 gauge wire (customer supplied) to make the connections shown in Figure 3.19. Make sure to install the jumper from PC40 connection P1-3 to P1-8.

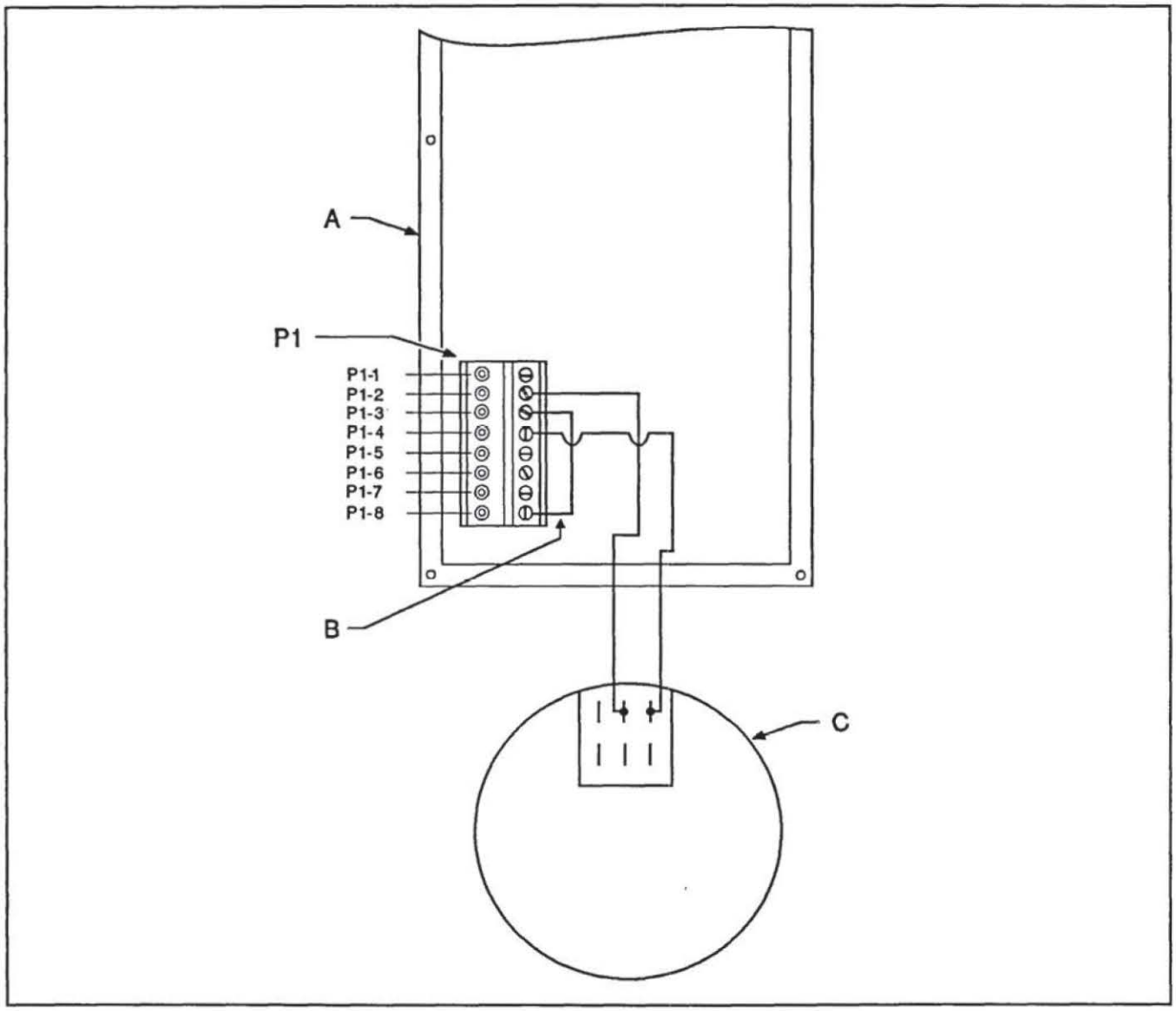


Figure 3.19 - Current sinking keyed lock out switch

A – Front assembly (rear view)
B –Install jumper wire
C – Keyed lock out switch (rear view)
P1 ("Remote Control"):
P1-2 ("Ground")
P1-3 ("Common")
P1-4 ("Lock")
P1-8 ("+12V")

Keyed Lock Out Switch Installation
(continued)

4. If you are NOT connecting other devices at this time, do the following:

   a. Grasp the front assembly with one hand. Remove the two screws holding it to the back enclosure.

   b. Carefully rotate the front assembly 180° and place it on the back enclosure.

   c. Replace and tighten the two loose screws.

   d. Tighten the four remaining screws.

5. If you are connecting other devices at this time, proceed to the appropriate procedure(s) in this section.

Section 4

Operating Instructions

P/N 108 389A
57-28 1/93

Section 4
Operating Instructions

1. Introduction

Through descriptions and examples, this section will provide the tools that will help you identify what patterns you want and how to get those patterns.

In "PC40 Parameters Overview" we will define the terminology associated with pattern control and identify the decision factors that you will consider when setting up your application pattern.

In "Setting Up the Pattern" you are given a step-by-step procedure for measuring your pattern, calculating values and making decisions which will be required when you program the PC40. A pattern log is provided at the end of the section. You can use copies for recording your choices and values in preparation for programming.

In "PC40 Start-up and Default Displays" you will become familiar with the power-up and normal operation displays that you will see.

In "Program Mode," "Run Mode," and "Configure Mode," you will learn which buttons to press to make selections and enter the values that you calculated in setting up your pattern. You will also learn how to eliminate unneeded parameters to make programming as easy as your application.

In "Test Mode" you will learn how to access this mode. You will also learn how to use TEST when you need to manually fire or purge the guns.

Throughout this section, the Nordson Oval push button will be referred to as the "Nordson Oval"; the Set push button as "SET"; and the four arrow-shaped push buttons as "UP," "DOWN," "LEFT," and "RIGHT."

2. PC40 Parameters Overview

Parameters are the choices and values that you have to program into the PC40. These choices and values, when properly set, will give you the material bead pattern(s) you want on the substrate.

The following paragraphs provide information on the different decisions involved in setting each parameter at each selection level. The initial display for each selection level is shown.

Memory

Definition

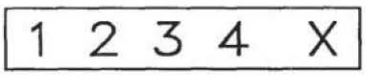
Four registers or locations in the PC40 microcomputer where patterns are saved.

Decision Factor

- number of patterns to store

The number of memories you select depends on how many separate patterns you plan to use. You can store from one to four patterns each consisting of up to four independent bead sequences (channels).

Channel



Definition:

The electronic timing circuitry in the PC40 that directs the output of one or more gun solenoids.

Decision Factors

- the number of different bead sequences being applied to a substrate within a given pattern, and/or
- the number of gun solenoids that are needed to put down that pattern, and/or

Bead Sequences - Figure 4.1 shows the bead sequence of a pattern. If beads in parallel sequences have the same length, same spacing between them, and same gun-to-gun response time, only one channel is needed to produce the pattern. If any one of these factors is different from sequence to sequence, more than one channel will be needed to produce the pattern.

Solenoids - Any number of solenoids can be fired by one channel as long as the combined gun solenoid demands do not exceed 1 amp.

Channel

(continued)

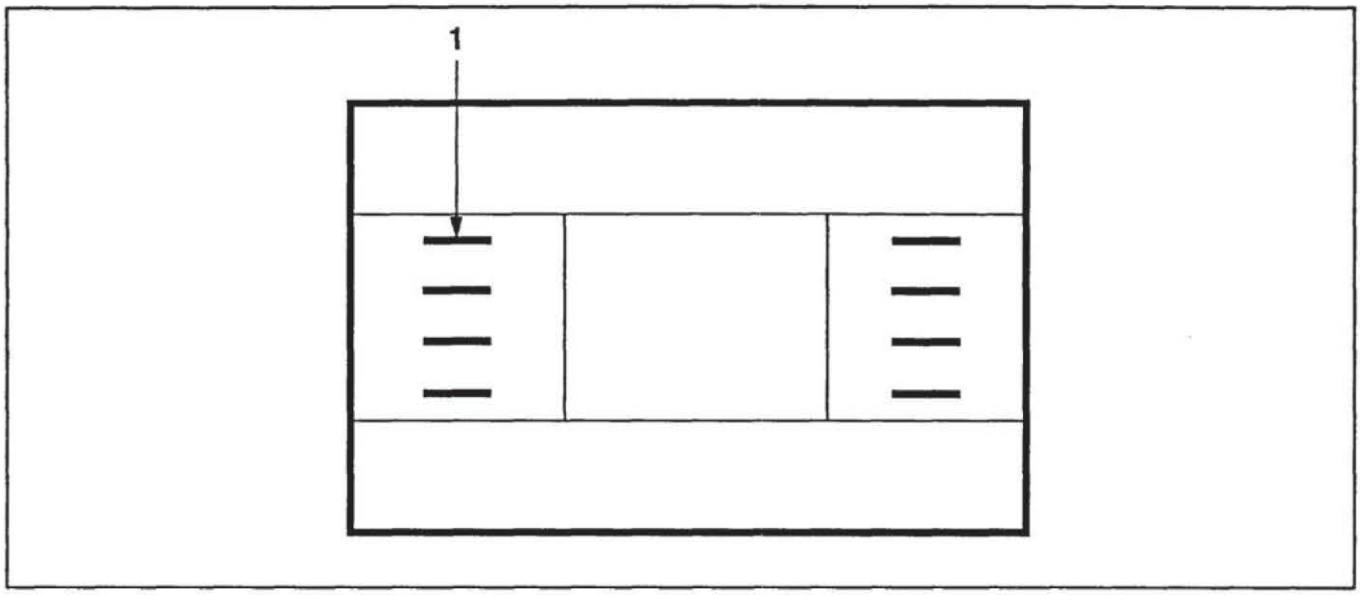
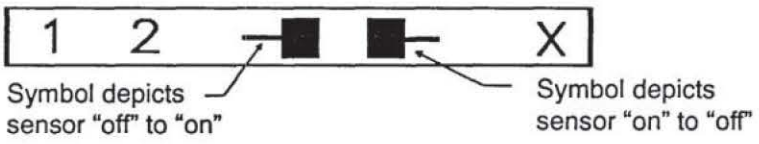


Figure 4.1 - Bead sequences

1 – Bead (gun on)

Trigger



Definition:

A device (e.g., photosensor) that senses the approach of a substrate and sends a trigger signal to the PC40.

Decision Factors:

- one or two triggers needed for the application
- assign a trigger to each channel
- for each channel, choose an edge symbol for triggering

Dark Operate - Whenever the sensor receiver does not "see" light, the sensor output device is "on."

Light Operate - Whenever the sensor receiver does "see" light, the sensor output device is "on."

NOTE: Nordson sensors are factory-set for light operate mode. Table 4.1 tells you which edge symbol to select for each operating circumstance.

Trigger

(continued)

Table 4.1 - Trigger Device Mode and Location, and Corresponding PC40 Edge Symbol Selection

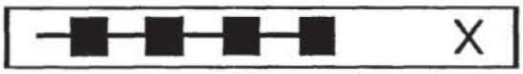
	Dark Operate Mode [1]		Light Operate Mode [2]	
	Leading Edge	Trailing Edge	Leading Edge	Trailing Edge
Opposed (Through-Beam) (P/N 131 473 and 131 486)				
Retroreflective (P/N 131 474 or 131 475)				
Diffuse Reflective (Proximity) (P/N 131 476)				

[1] For diffuse reflective sensors, this is the preferred mode for minimizing false triggers.

[2] For opposed and retroreflective sensors, this is the preferred mode for minimizing false triggers.

Limit Switches - These can be used as a trigger device with the PC40. For better accuracy and reliability, though, use Nordson photosensors.

Transition



Definition:

A change from one interval to the other: either a change from a delay to a duration or from a duration to a delay. The combination of delays and durations makes up a transition sequence (Figure 4.2).

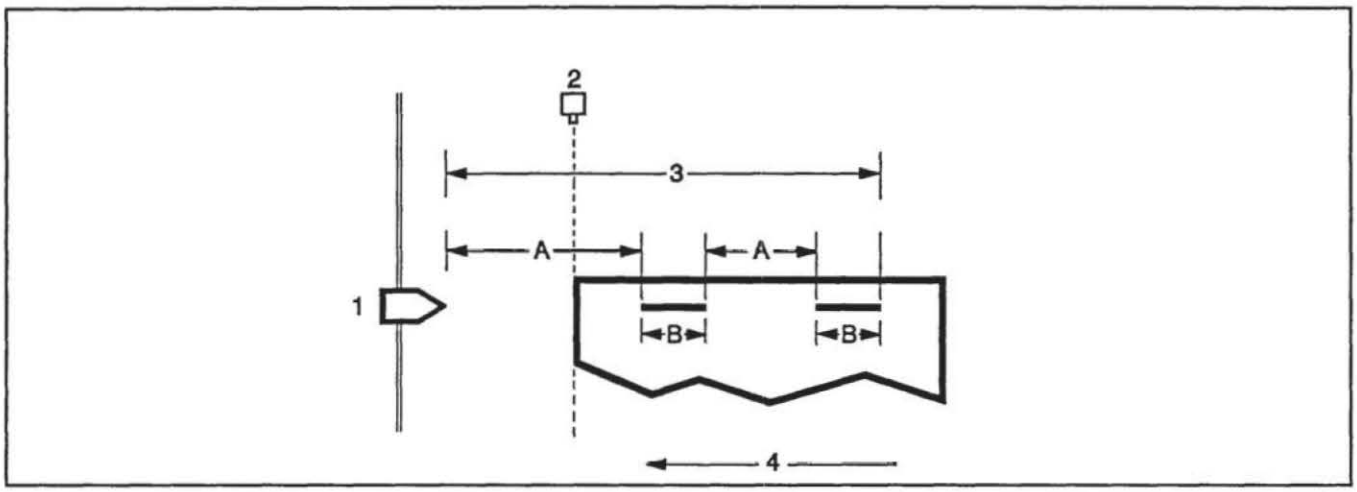


Figure 4.2 - Delays and durations

A – Delay (Off)
B – Duration (On)
1 – Gun
2 – Trigger
3 – Transition sequence
4 – Line travel direction

Decision Factors:

- number of transitions - dependent upon number of delays and durations
- delays - lengths of spaces between beads
- durations - material bead lengths
- transition set-points - cumulative sum of delay and duration values

The placement of every bead of material on the substrate requires at least two time intervals to be completed: one delay (gun off) followed by one duration (gun on).

NOTE: Nordson timers commonly use the first pattern interval as a delay. In Figure 4.2, the pattern consists of a delay, a duration, a second delay, and a second duration. Each new pattern starts with the first delay interval.

The PC40 allows you to program from one to four delays and from one to four durations.

Transition
(continued)

In programming the PC40, the transition values refer to the end-point of each delay and each duration. Each end-point is defined in relation to the trigger signal, which is the starting point of the entire transition sequence. Each transition value is a distance measure that is converted to time values.

NOTE: The initial delay for an application with a leading edge trigger has to account for the trigger to gun distance (A in Figure 4.3) plus the distance from the leading edge to the first transition (B in Figure 4.3). The first transition (T_1) in Figure 4.3 is 700 ms. The 700 ms length includes the trigger to gun interval of 400 ms plus the 300 ms from the leading edge of the substrate to the first delay interval.

The second transition (T_2) is 1000 ms, which is the end point of the first duration ***in relation to the trigger signal.*** It is important not to confuse the length of the duration, 300 ms, with the transition, T_2, which is 1000 ms.

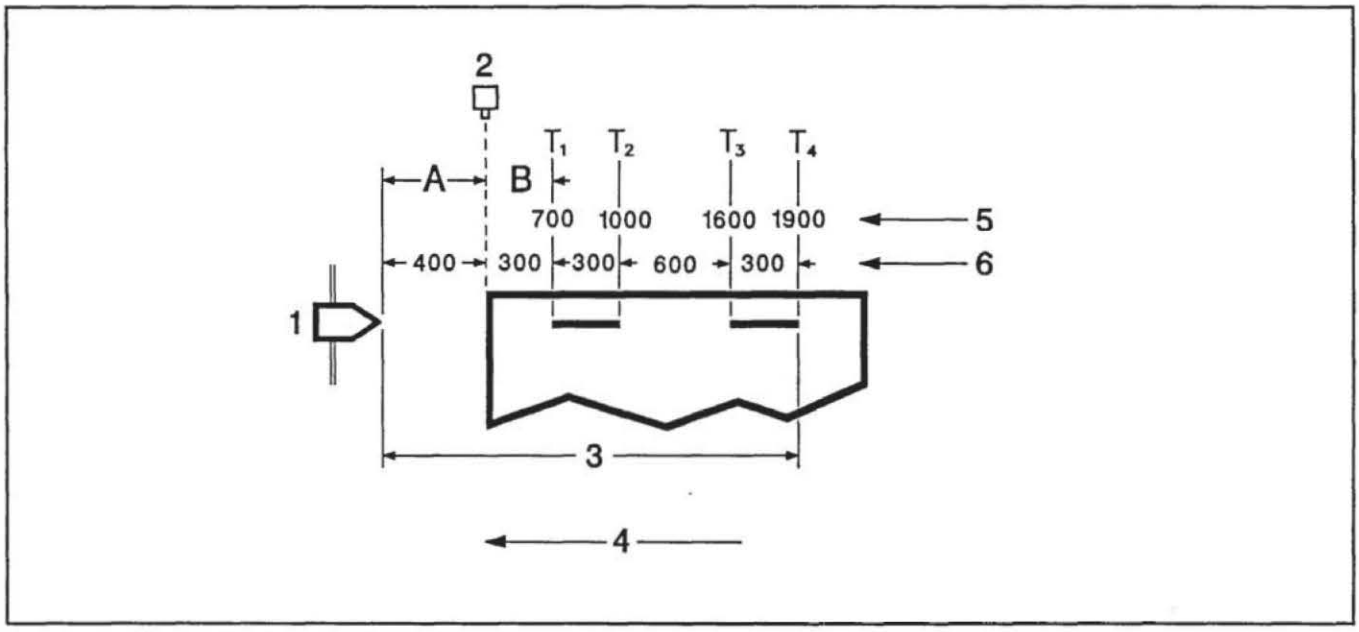
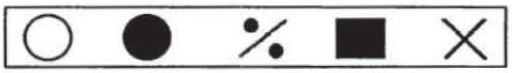


Figure 4.3 - Determining transition lengths

A – Gun to trigger distance
B – Leading edge to start of first duration
1 – Gun
2 – Trigger
3 – Transition sequence
4 – Line travel direction
5 – Cumulative transition lengths (in ms)
6 – Delay/duration lengths (in ms)

Stitch



Definition:

Material application with a duration that consists of a repeating pattern of short material beads (stitch lengths) with uniform spaces (stitch gaps) between them.

Decision Factors:

- material savings
- pattern requirement

In the stitch level, you can select a percentage of coverage and stitch bead length for a given duration. Selecting less than 100% coverage during durations may still meet your application needs, plus allow you to save on material costs.

During each duration in a pattern, a bead of material is deposited. However, when stitching is selected, this bead is broken up into a number of smaller beads (stitch lengths) with uniform spaces (stitch gaps) between them (Figure 4.4).

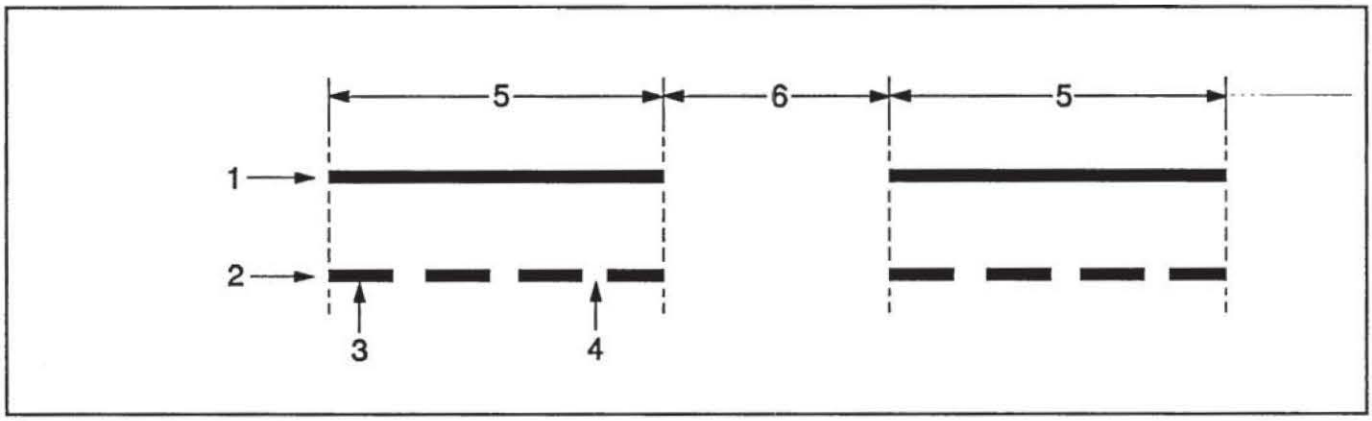


Figure 4.4 - Continuous and stitch beads

1 – Stitch off
2 – Stitch on
3 – Stitch length
4 – Stitch gap
5 – Duration
6 – Delay

NOTE: Stitch is not intended to provide precise bead placement. If you need precise placement of small beads, channels can be used in parallel with stitch off to achieve up to 32 transitions (for 4 channels in parallel).

3. Setting Up the Pattern

Because the PC40 is digitally programmed, all pattern values can be calculated and programmed in advance.

It may be helpful to draw a simple diagram of the pattern you want (like the one shown in Figure 4.5). Leave sufficient space on your diagram for recording trigger to gun and bead measurements. Measurements should be made in millimeters or inches.

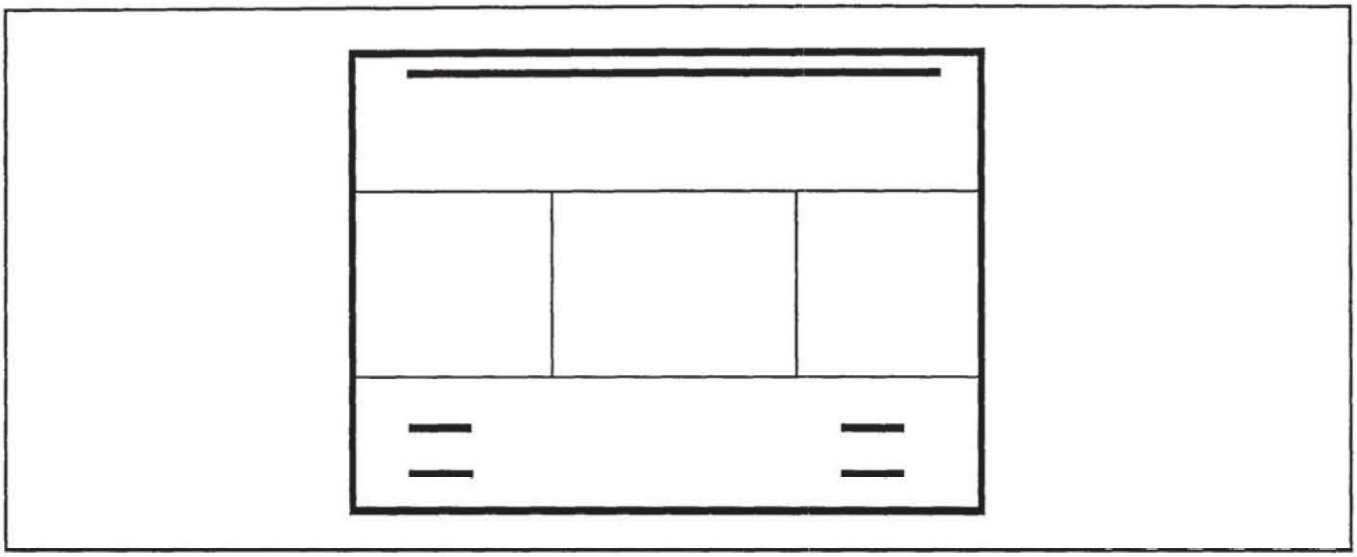


Figure 4.5 - Example 1 pattern

The following example assumes that the trigger and an appropriate number of guns have already been installed. Typically, one output channel fires one gun to produce one bead sequence. More than one gun may be controlled by an output channel if two or more identical bead sequences are required and if the gun response times do not vary significantly.

Example 1: Cartoning (One End Only)

Assume the following:

- This is a dedicated line (only one carton size will be run with the same pattern for each carton).
- Line speed is constant.
- The difference in gun-to-gun response time does not significantly effect bead positions.
- A diffuse reflective sensor is being used in dark operate mode and is located to sense the leading edge of the substrate.
- 8 watt solenoids are being used.

Measuring Distances

After you draw your pattern (as shown in Figure 4.5), you will need to measure the length of each delay and duration of your pattern. Write the measurements on the drawing as shown in Figure 4.6.

Example 1: Cartoning (One End Only)

(continued)

NOTE: The first delay measurement must include the gun to trigger distance (A) plus the distance from the edge of the substrate to the start of the first duration (B).

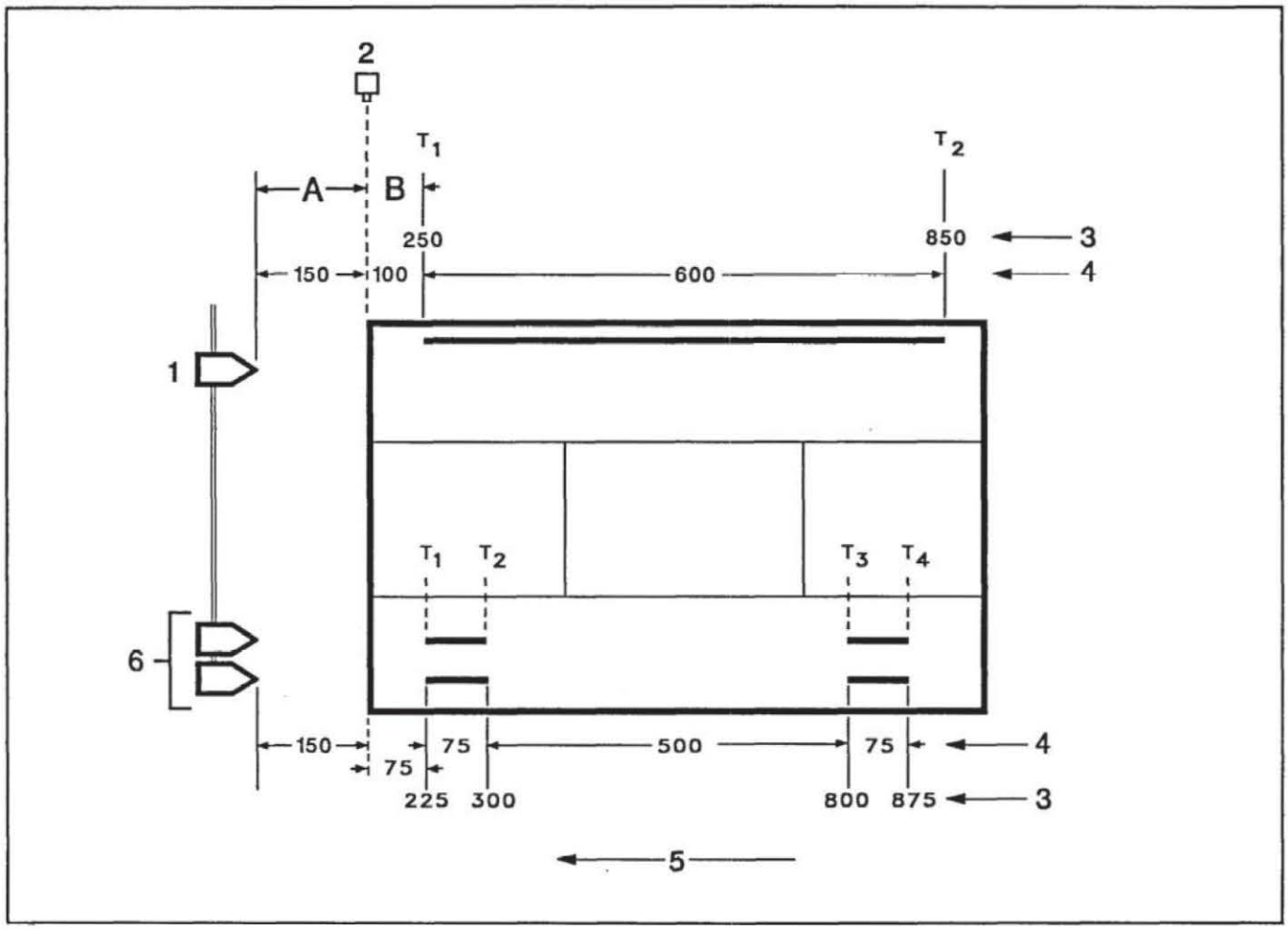


Figure 4.6 - Measuring delays/durations for example 1

A – Gun to- trigger distance
B – Leading edge of substrate to start of first duration
1 – Gun 1; assigned to separate channel from guns 2 and 3
2 – Trigger
3 – Cumulative distances (mm)
4 – Delay/duration distances (mm)
5 – Line travel direction
6 – Guns 2 and 3; assigned to separate channel from gun 1

Example 1: Cartoning (One End Only)

(continued)

Converting Distance Measurements to Time Values

Each of the distances must be converted to time values.

1. Measure the conveyor line speed. (1)
   - Metric: measure in meters per minute (m/min)
   - English: measure in feet per minute (ft/min)

2. Use the appropriate formula to convert each measurement to a time value. (2)
   - Metric: $\frac{0.06 \times Distance\ (mm)}{Line\ Speed} = Time\ in\ seconds$
   - English: $\frac{5 \times Distance\ (in.)}{Line\ Speed} = Time\ in\ seconds$

3. Calculate all the transition values for your pattern by adding up the delays and durations. Write them on your pattern drawing.

(1) For this example, the line speed is 45.7 m/min (150 ft/min).

(2) In the gun 1 bead in this example, the first delay (T_1) includes the gun to trigger distance of 150 mm plus the 100 mm distance from the substrate edge to the start of the first duration. This cumulative distance (250 mm) was then converted using the Metric formula:

$$\frac{0.06 \times 250\ mm}{45.7\ m/min} = 0.328\ seconds\ (328\ ms)$$

In the two lower bead sequences, the first delay (T1) includes the gun to trigger distance of 150 mm plus the 75 mm distance from the substrate edge to the start of the first duration. This cumulative distance (225 mm) was then converted using the Metric formula:

$$\frac{0.06 \times 225\ mm}{45.7\ m/min} = 0.295\ seconds\ (295\ ms)$$

Example 1: Cartoning (One End Only)

(continued)

Illustrated Pattern Parameters - Figure 4.7 shows the converted time values (transitions) for this example. Figure 4.8 shows how the parameters are recorded on the pattern log for this example.

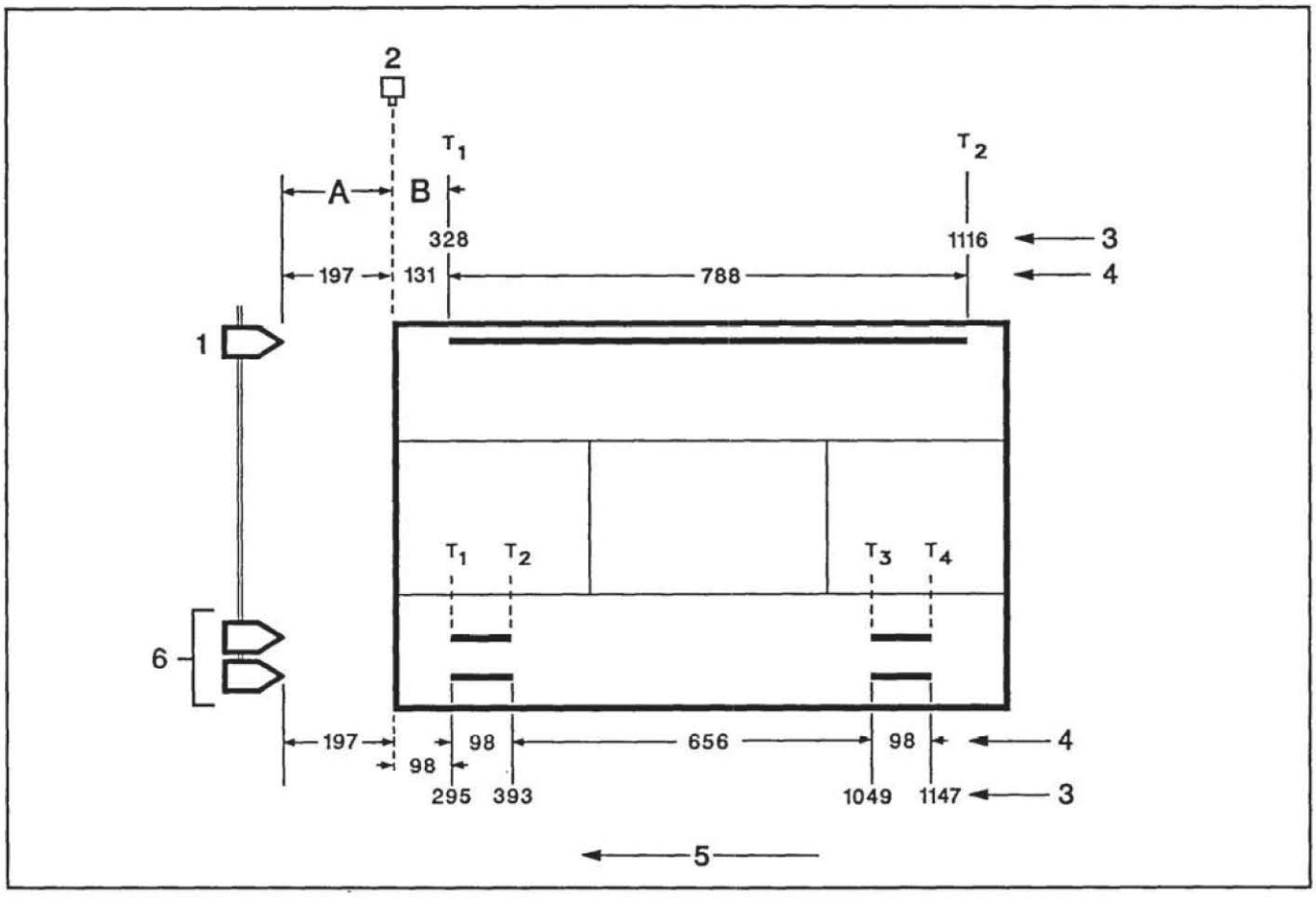


Figure 4.7 - Example 1 transitions changed to time values

A – Gun to trigger distance
B – Leading edge of substrate to start of first duration
1 – Gun 1, assigned to separate channel from guns 2 and 3
2 – Trigger
3 – Cumulative time values (in ms)
4 – Separate delay/duration time intervals (in ms)
5 – Line travel direction
6 – Guns 2 and 3; assigned to separate channel from gun 1

Example 1: Cartoning (One End Only)

(continued)

Programming Decision Factors for This Example:

Memory - One memory is needed. Memory B is circled on the pattern log, but any configured memory could be selected.

Channel - Two channels are needed because:

- Two gun solenoids are used (one for gun 1, and one for guns 2 and 3).
- There are two sets of transition values. Even though there are three bead sequences, the lower two have identical transition values.

Channels 1 and 2 are circled on the pattern log.

Trigger - Only one trigger is needed. The diffuse sensor is being used in dark operate mode and is mounted to sense the leading edge of the substrate. By referring to Table 4.1, the appropriate edge symbol was determined. That symbol is circled on the pattern log for both channels.

Transition

- Two transitions are needed for the gun 1 bead shown in the Figure 4.6: one delay and one duration. The values are written on the pattern log for channel 1.
- Four transitions are needed for the gun 2 and 3 bead sequences: two delays and two durations. The values are written on the pattern log for channels 2 and 3.

Stitch - This pattern does not require stitching, so the stitch off symbol is checked on the pattern log for both channels. Example 2, which follows, shows a pattern that requires stitching.

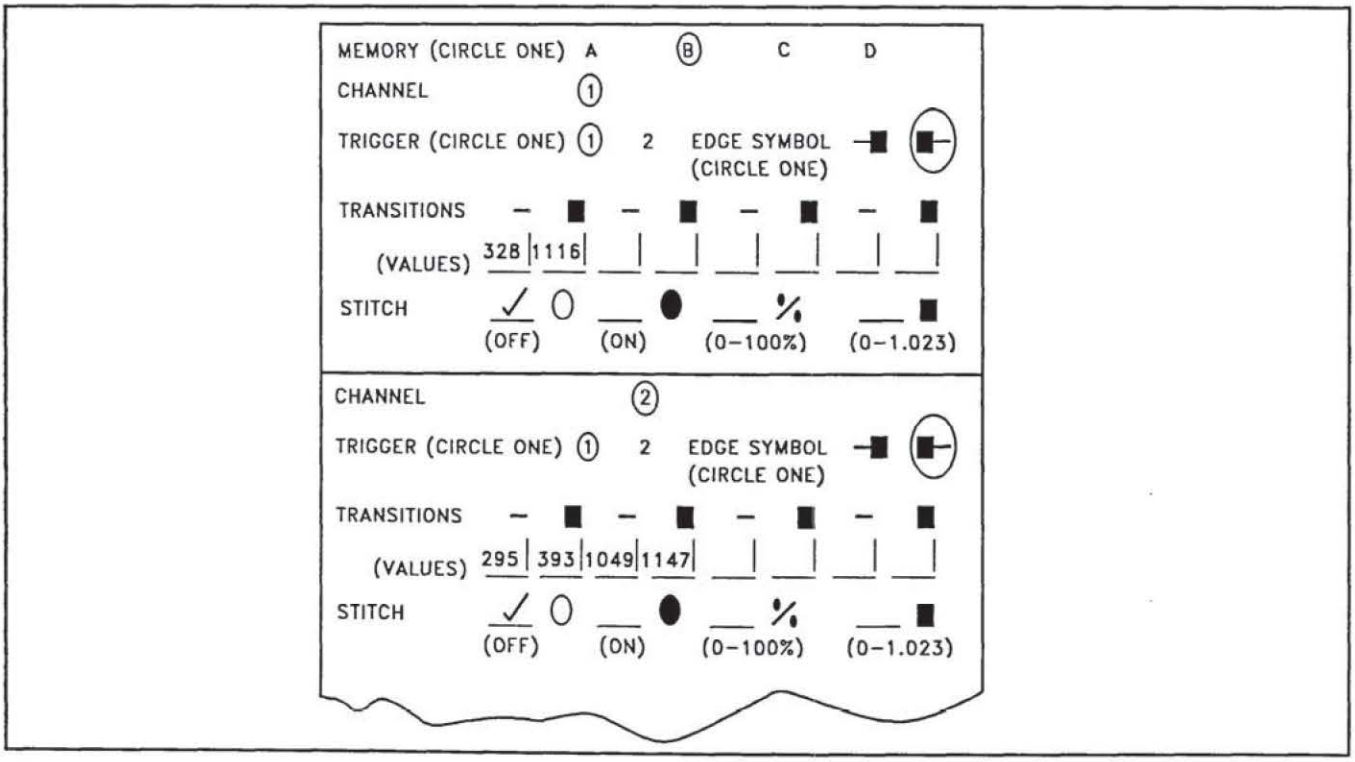


Figure 4.8 - Pattern log for example 1

Example 2: Cartoning with Stitch On

The assumptions, distances, and time values are the same as in Example 1.

Stitch - The bead sequence for gun 1 (assigned to channel 1) requires stitching (Figure 4.9).

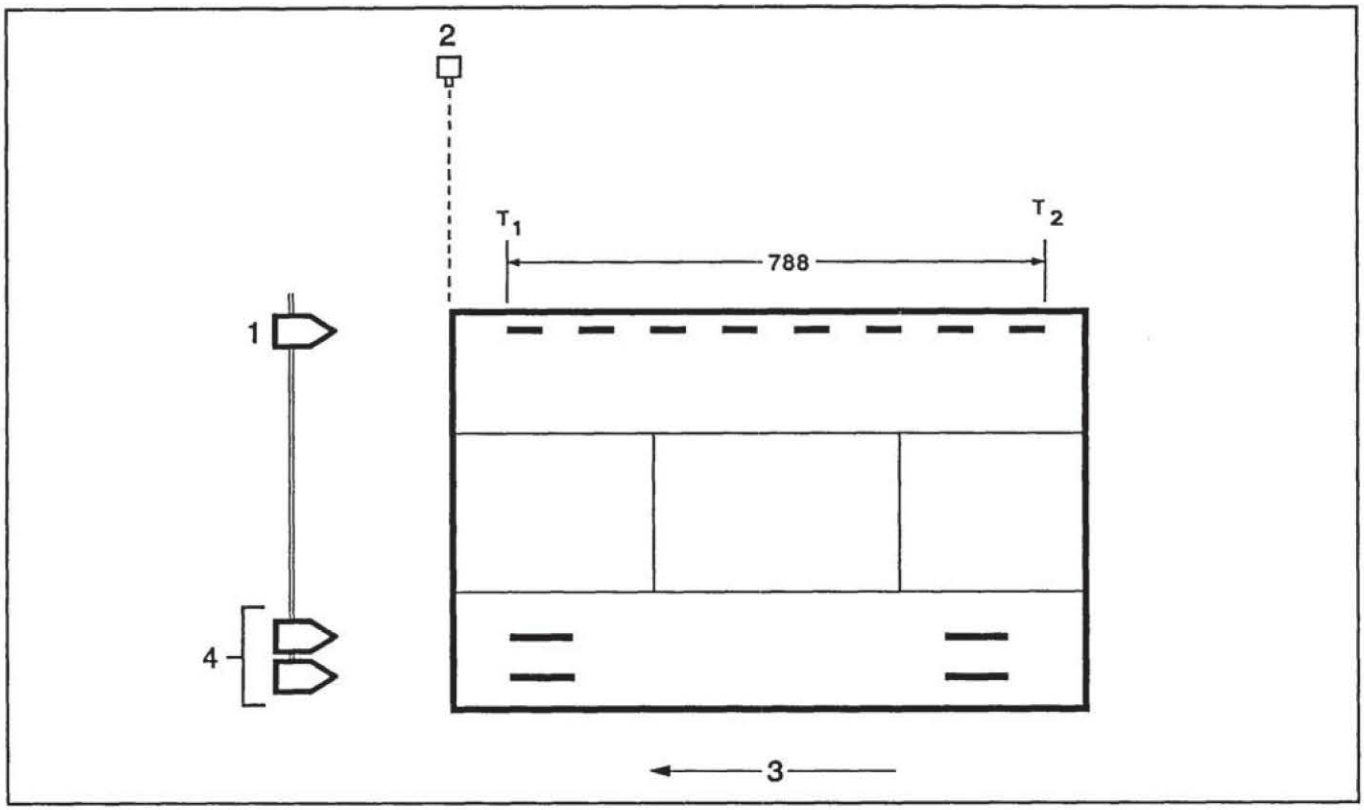


Figure 4.9 - Example 2: stitch pattern

1 – Gun 1; assigned to separate channel from guns 2 and 3
2 – Trigger
3 – Line travel direction
4 – Guns 2 and 3; assigned to separate channel from gun 1

Example 2: Cartoning with Stitch On
(continued)

Determining Maximum Stitch Bead Length - We determined this value using the following general rule:

- *Duration length (in seconds) x 0.20 = Max. stitch bead length (in seconds)*

In this example, the maximum stitch bead length is 0.158 seconds:

- 0.788 *x* 0.20 = 0.1576 *seconds* (157.6 *ms*)

We rounded the value to 0.158 seconds (158 ms). The PC40 stitch capability would allow us to specify stitch beads as long as 0.158 seconds each.

However, we wanted more and shorter stitch beads for our application. We ran several test patterns and got the following results.

Stitch Bead Lengths at 50% Coverage	Number of Beads
0.050	8
0.060	7
0.070	6
0.082	5

Based on the test patterns and our application, we specified beads 0.050 seconds long at 50% coverage. These values were recorded on the pattern log (Figure 4.10).

Stitch on was programmed and noted on the pattern log for channel 1.

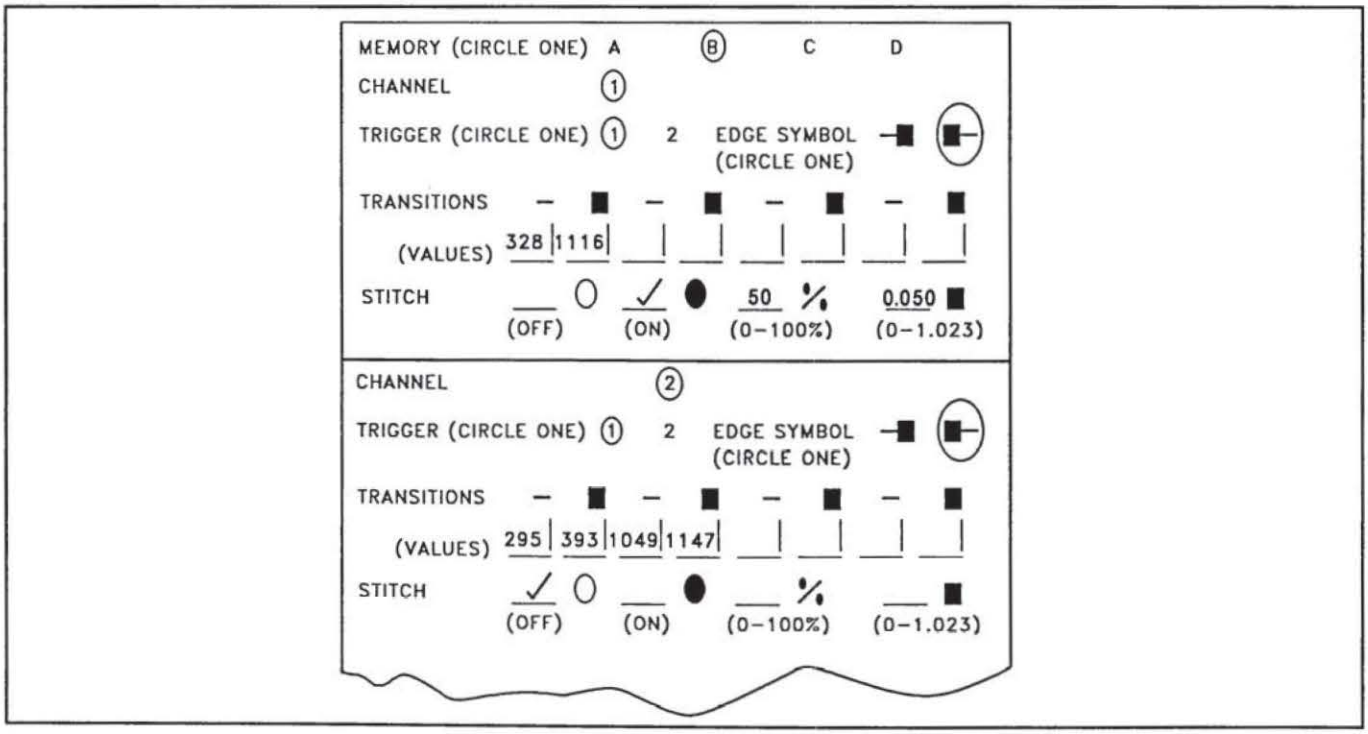


Figure 4.10 - Pattern log for example 2

4. PC40 Start-up and Default Displays

Start-up Display

This display appears for approximately 2-3 seconds while the unit performs a short diagnostic sequence (Figure 4.11).

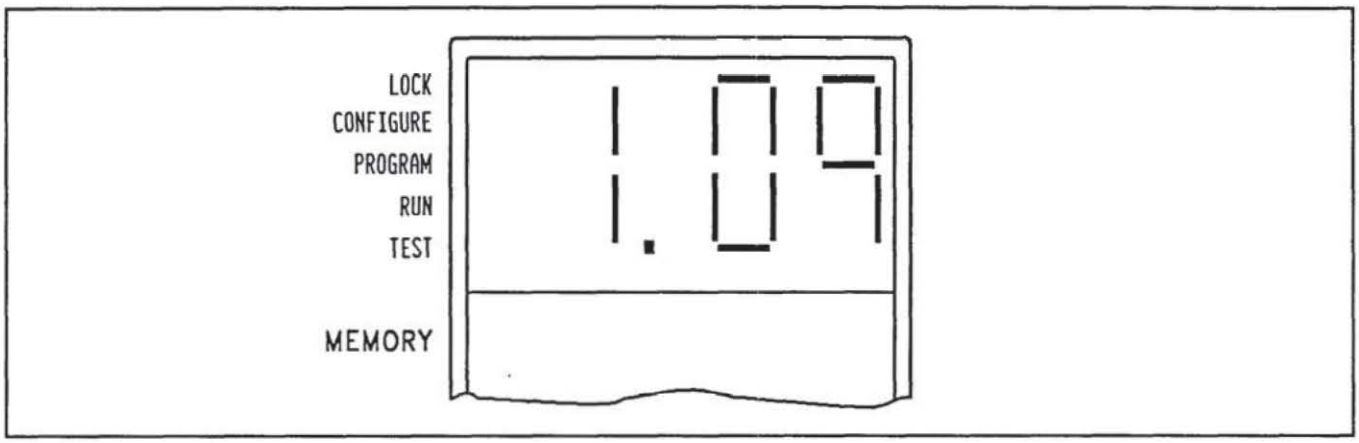


Figure 4.11 - Start-up display

During the diagnostic sequence, the Status LED on the front panel is red. After the diagnostic sequence ends, the default display appears and the Status LED turns green. The unit is ready for operation.

Default Display

The active memory letter is displayed on the Memory selection level (Figure 4.12). This tells you which pattern is ready to use.

The program returns to this display whenever:

- any mode is exited, or
- there is a 10 minute period in which no push buttons are pressed.

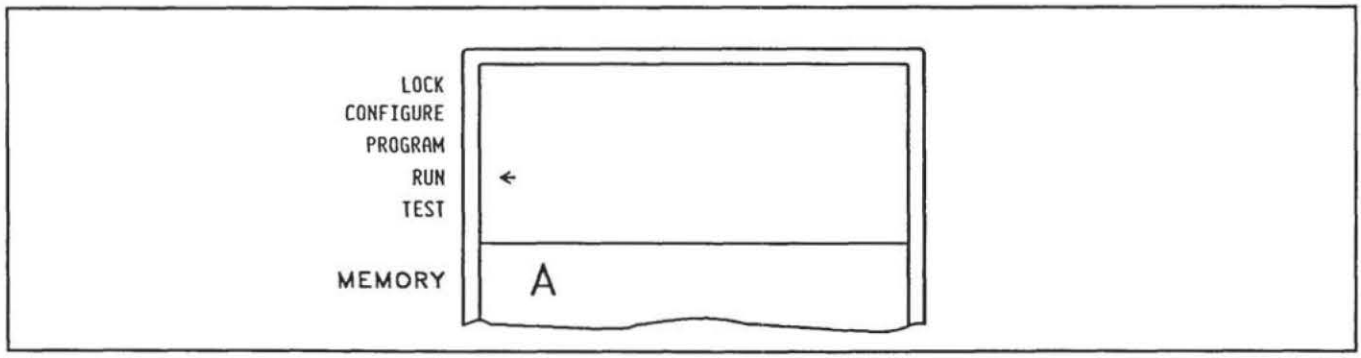


Figure 4.12 - Default (RUN mode) display

5. Program Mode

NOTE:

- If you are programming a PC40 that has previously been programmed, not all the parameters you want to program may be available. Follow the instructions in "Run Mode" ("Reviewing Parameters and Values") later in this section. If the parameters you want to program are displayed in the review, return to this section and proceed with the following instructions.
- If the parameters you want to program are not displayed in the parameter review, follow the instructions in "Configure Mode" (in this section) to make the parameters available. Then, return to this section and proceed with the following instructions.

NOTE: If power is interrupted while changes are being made in the Program mode, those changes will not be stored in memory. As soon as you are finished making changes, be sure to exit the Program mode. This saves all changes.

Purpose

This mode provides you with the ability at system start-up or while the unit is operating to

- program or change the active memory;
- program inactive memories;
- activate or deactivate channel, trigger, transition, and stitch selections; and
- set or change the numerical values.

Accessing Program Mode

Press and hold SET. The initial Program mode display appears (Figure 4.13).

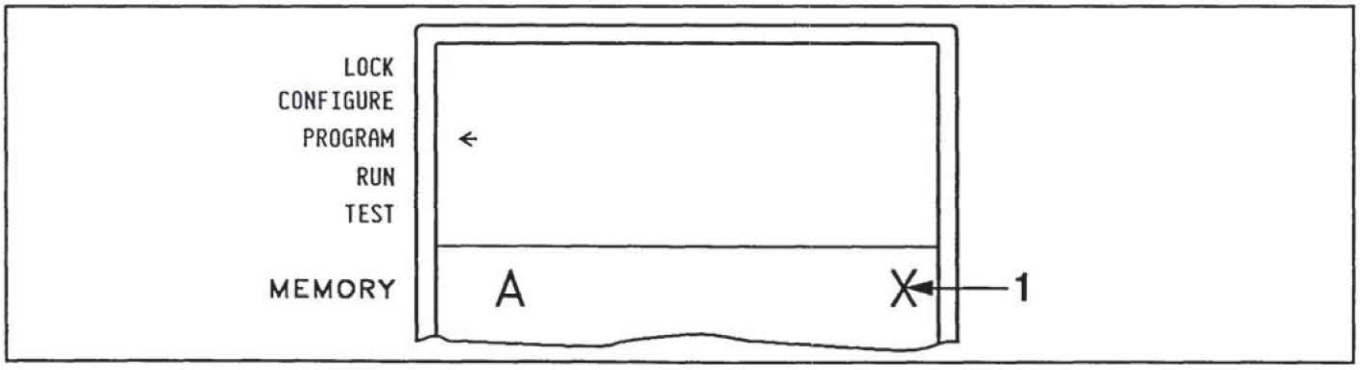


Figure 4.13 - Initial Program mode display (memory A selected as active)
1 – "X" flashing

Changing Selection Levels

While "X" is flashing, press DOWN or UP.

Exiting Program Mode

While "X" is flashing on any selection level, press SET. The default display will appear (Figure 4.12).

Programming Memory

NOTE: Only one memory letter is initially displayed (Figure 4.13). This is the active memory. You can program the active memory or any of the inactive memories.

NOTE: Changes you make to the active memory pattern take effect in-process with the next trigger signal. During set-up, press the Nordson Oval to activate changes made between trial patterns. Changes to inactive memories can be stored for later use. *Changes are not saved as you make them.* To save changes in memory, you must exit the Program mode.

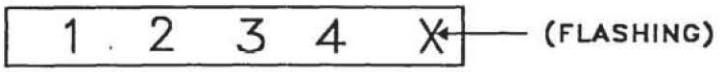
Changing the Active Memory

Push Button Sequence	Result
1. Press and hold SET.	1. The active memory letter is displayed constantly (not flashing). "X" is flashing on the memory selection level.
2. Press LEFT or RIGHT to move to the letter that you want to select as the active memory.	2. The memory letter is flashing.
3. Press the Nordson Oval to activate that memory.	3. The letter is displayed constantly (not flashing); "X" flashing at the Memory level.

Selecting a Memory to Program

Push Button Sequence	Result
1. Press and hold SET.	1. Initial Program mode display shown (Figure 4.13, above).
2. Press LEFT or RIGHT to select a memory letter.	2. The active memory letter is replaced by a flashing letter indicating the current selection position.
3. When the desired memory is flashing, press SET to program the parameters.	• The program automatically moves to the Channel selection level. • "X" is flashing at the right of the level.

Programming Channel



Default Display

Programming Selections for the Channel Level

- the number of channels

Selecting A Channel for Programming (1)

Push Button Sequence	Result
1. Press LEFT or RIGHT to move to the channel number that you want to program	1. The channel number is flashing.
2. Press SET.	2. The channel number stays on constantly (without flashing). • The program automatically moves to the Trigger selection level. • "X" is flashing at the right of the level.
(1) Activated or deactivated channels can be programmed.	

The Difference Between Activated and Deactivated Channels

Activated channels are those that are turned on (provide gun output) for a selected memory. Deactivated channels are those that are turned off (provide no gun output).

The PC40 has four memories, each of which can save one pattern. However, it is possible to save more than one pattern per memory ***if*** some of the patterns require less than four channel outputs. Figure 4.14 shows an example of how this can be done by deactivating and reactivating channels. By keeping channels 1 and 4 activated, and deactivating channels 2 and 3, you could save and use the pattern in View A. By deactivating channels 1 and 4, and reactivating channels 2 and 3, you could save and use the pattern in View B.

NOTE: Only the channels that are activated for a memory are shown in the Channel selection level display.

NOTE: When reactivating and deactivating channels, previously programmed values are maintained.

Programming Channel

(continued)

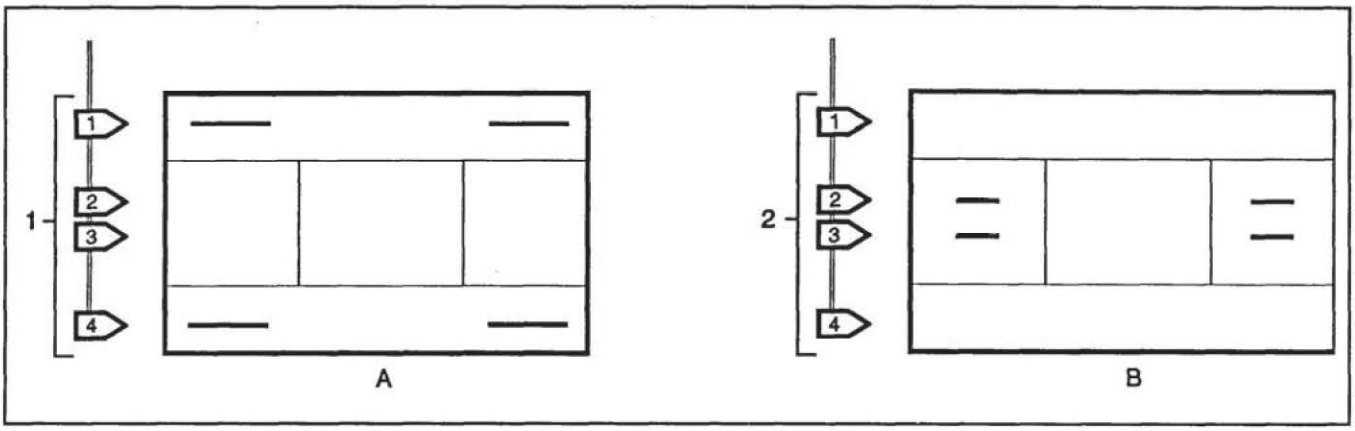


Figure 4.14 - Activating/deactivating examples

A – First pattern
1 – Guns: 1 and 4 activated; guns 2 and 3 deactivated

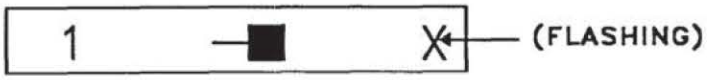
B – Second pattern
2 – Guns: 2 and 3 activated; guns 1 and 4 deactivated

Programming Steps to Reactivate or Deactivate a Channel

Push Button Sequence	Result
1. Look at the initial Channel selection level display to determine which channel(s) are activated (1).	
2. Press LEFT or RIGHT to move to the channel number that you want to change.	2. The selected channel number is flashing.
3. Press UP and DOWN at the same time.	3. The program remains in the Channel level and displays the new active channel. The channel state, activated or deactivated, is reversed.
4. Repeat steps 1 through 3 to change additional channels.	
(1) Activated channel numbers are displayed on the LCD.	

Programming Trigger

Default Display



Programming Selections for the Trigger Level

- Trigger 1 or 2
- Edge symbol

Making a Trigger Choice

Push Button Sequence	Result
1. Press LEFT or RIGHT to move to trigger 1 or 2.	1. The display shows the selected trigger number flashing.
2. When the desired trigger is flashing, press SET.	• The trigger number is displayed constantly (not flashing). • "X" is flashing on the Trigger selection level.

Making an Edge Choice

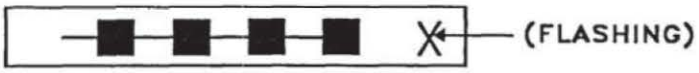
Push Button Sequence	Result
1. Press LEFT or RIGHT to select the leading or trailing edge symbol.	1. The selected edge symbol is flashing on the LCD.
2. Press SET.	• The selected edge symbol is displayed constantly (not flashing). • "X" is flashing on the Trigger selection level.

Moving to the TRANSITION Selection Level

Push Button Sequence	Result
Press DOWN.	• The transition symbols are displayed constantly (not flashing). • "X" is flashing on the Transition selection level.

Programming Transition

Default Display



Selecting a Transition

Push Button Sequence	Result
1. Press LEFT or RIGHT to select a transition symbol.	• The selected symbol is flashing. • The current value for that transition is displayed in the numerical display area.
2. Press SET.	• The selected symbol is flashing. • The right-most digit of the value is flashing (Figure 4.15).

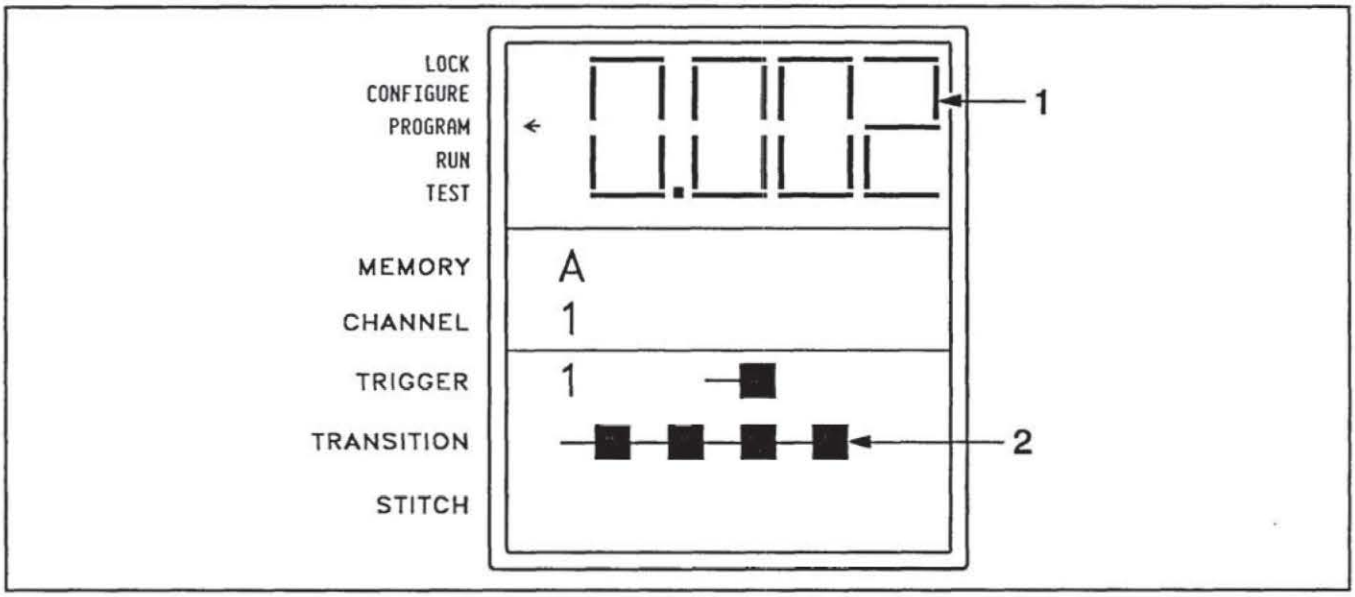


Figure 4.15 - Program mode TRANSITION value display

1 – Right-most digit flashing

Programming Transition

(continued)

Setting the Transition Value

Push Button Sequence	Result
1. Press LEFT or RIGHT to select a digit position.	1. The selected digit is flashing on the LCD.
2. Press UP (to increase the digit value) or press DOWN (to decrease the value).	2. The digit value increases or decreases.
3. Repeat the steps 1 and 2 until all the digits are set to the value you want.	
4. Press SET.	• The value is entered into memory. • The program moves to the next transition symbol to the right (which is flashing; and the current value for the transition is displayed), or • If this is the eighth or last configured transition, the program moves to "X", which is flashing on the Transition level.
5. Repeat steps 1 though 4 until you have the values that you want for all the transitions.	

Implementing Transition Changes Between Patterns

You may want to enable changes to these values between patterns in set-up or during intermittent operation.

Push Button Sequence	Result
1. Repeat the steps in "Selecting a Transition" and "Setting the Transition Value."	1. The transitions are set to new values.
2. Press the Nordson Oval.	• The pattern in progress is interrupted. • Operation resumes (using the new values) when the next trigger signal is received.

Programming Transition

(continued)

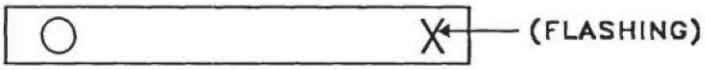
Moving to the STITCH Selection Level

Push Button Sequence	Result
1. If "X" is not flashing on the Transition level, press LEFT or RIGHT.	• The transition symbols flash as you press LEFT or RIGHT • "X" is flashing on the Transition level.
2. Press DOWN.(1)	• The stitch symbol is displayed constantly (not flashing). • "X" is flashing on the Stitch selection level.
(1) The program will not allow you to access Stitch mode if you selected Stitch Off in the Configure mode. Refer to "Configure Mode" later in this section.	

Programming Stitch

NOTE: The program will not allow you to access Stitch mode if you selected Stitch Off in the Configure mode. Refer to "Configure Mode" later in this section.

Default Display



Deactivating Stitch

NOTE: Deactivating stitch turns stitching off for the channel that you are programming. However, the values for % coverage and bead length are still saved in memory for later use if you reactivate stitch for this channel.

Push Button Sequence	Result
1. Press LEFT or RIGHT to move to the stitch off symbol.	1. The stitch off symbol is flashing: (FLASHING) → ○
2. Press SET.	• The stitch off symbol is displayed constantly (not flashing). • "X" is flashing on the Stitch level (see the default display above).

Programming Stitch

(continued)

Reactivating Stitch

Push Button Sequence	Result
1. Press LEFT or RIGHT to move to the stitch on symbol.	• The stitch off symbol is displayed constantly and • The stitch on symbol is flashing: (FLASHING) → ●
2. Press SET.	• The stitch on symbol is displayed constantly (not flashing). • The stitch percentage symbol is flashing. • The right-most digit of the current stitch % value is flashing in the numerical display area (Figure 4.16).

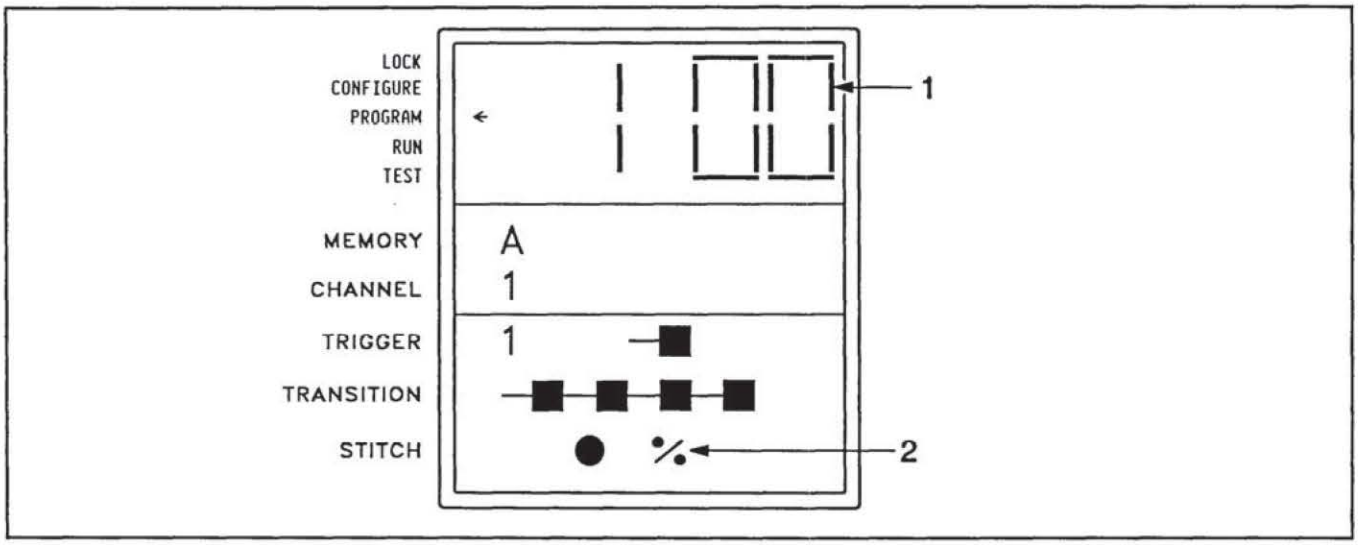


Figure 4.16 - Program mode, stitch percentage display

1 – Right-most digit flashing

2 – Percent symbol flashing

Determining % Coverage

You can set coverage from 0-100%. Of course, if you select 0% or some other small value, you will have either no stitch beads or extremely small stitch beads. If you select 100% coverage or some other large value, you will have either one continuous bead or an almost continuous bead.

To achieve a useful stitch pattern, we recommend that you begin with 50% coverage. From there, you can increase or decrease the coverage to suit your application.

Programming Stitch

(continued)

Entering % Coverage Values

Push Button Sequence	Result
1. If the setting is 100% and you want to set it to a lower percentage:	
a. Press LEFT or RIGHT to move to the left-most digit.	a. The left-most digit is flashing.
b. Press DOWN.	b. The value changes to 0.
2. Press LEFT or RIGHT to select a digit position.	2. The selected digit is flashing on the LCD.
3. Press UP (to increase the digit value) or press DOWN (to decrease the value).	3. The digit value increases or decreases.
4. Press SET.	• The percentage value is saved in memory. • The stitch bead length symbol is flashing, • The current bead length value is displayed, and the right-most digit is flashing (Figure 4.17)

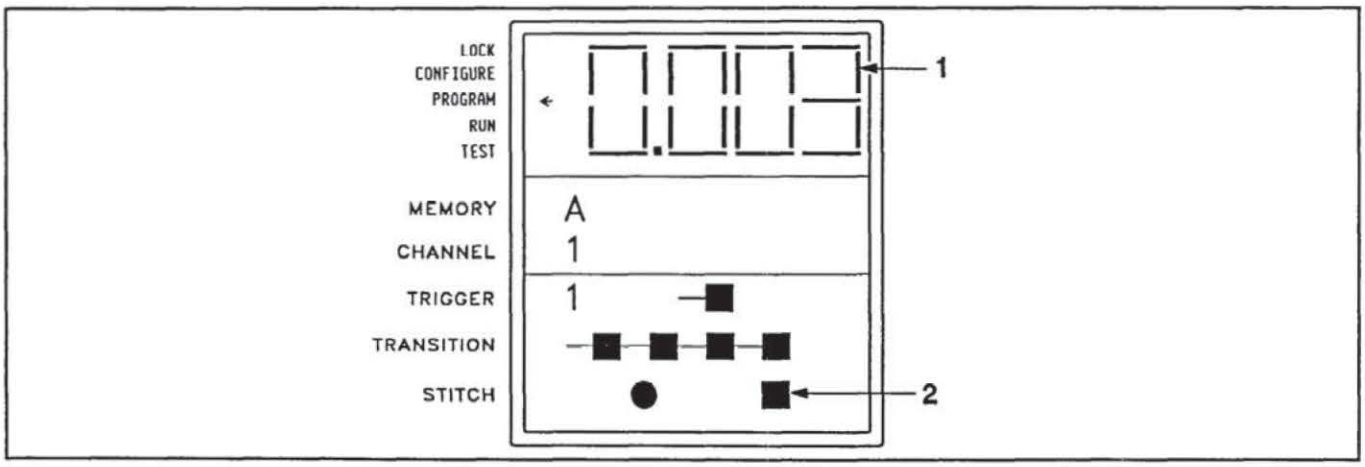


Figure 4.17 - Program mode, stitch bead display

1 – Right-most digit flashing

2 – Bead symbol flashing

Programming Stitch

(continued)

Determining Stitch Bead Length

This setting defines the length of each stitch bead that will be deposited during each stitched duration. You can set the length from 0 to 1.023 seconds per bead.

Similar to setting % values, selecting a very small stitch bead value will result in an almost continuous bead and may exceed the mechanical response time capabilities of the gun and solenoid. Depending on how large a stitch bead value is selected, you may have only one bead deposited during any duration.

To achieve a useful stitch pattern, Nordson recommends that you begin with a stitch bead that equals 1/5 of the duration length (unless you have other specific requirements). For example, a 0.500 second duration should have no more than a 0.100 second stitch bead lengths. Based on test patterns, you can then increase or decrease the bead length to suit your application.

Entering Bead Length Values

Push Button Sequence	Result
1. Press LEFT or RIGHT to select a digit position.	1. The selected digit is flashing on the LCD.
2. Press UP (to increase the digit value) or press DOWN (to decrease the value).	2. The digit value increases or decreases.
3. Repeat the steps 1 and 2 until bead length is set to the value you want.	
4. Press SET.	4. "X" is flashing on the Stitch level.

6. Run Mode

Purpose

Run Mode enables you to

- reset the pattern and to
- review the programmed parameters and values.

This is the PC40 operational mode. You must be in this mode in order to access any other mode or to view program parameters.

Accessing Run Mode

After start-up, the PC40 automatically defaults to this mode. The unit returns to this mode whenever:

- SET is pressed while "X" is flashing in any selection level,
- there is a 10 minute period in which no push buttons are pressed.

Resetting the Pattern

Press the Nordson Oval to reset the pattern. The pattern will restart when the PC40 receives the next trigger signal.

Reviewing Parameters and Values

The selections programmed for each available memory can be reviewed in the Run mode.

Parameter Review Sequence

Selection Level	Push Button Sequence	Result
Memory	1. Press DOWN.	1. The LCD displays the active memory; "X" is flashing on the Memory level.
	2. Press LEFT or RIGHT until the memory symbol that you want to review is flashing.	2. The selected memory letter is flashing.
	3. Press SET.	• The selected memory letter is displayed constantly on (not flashing). • The active channel numbers for this memory are displayed. • "X" is flashing on the Channel level.
Channel	4. Press LEFT or RIGHT until the channel symbol that you want to review is flashing.	4. The selected channel number is flashing and the memory letter is displayed.
	5. Press SET.	• The selected memory letter is displayed. • The channel number is displayed. • The trigger and edge symbol are displayed. • The transition symbols are displayed and "X" is flashing on the Transition selection level.

Reviewing Parameters and Values

(continued)

Parameter Review Sequence (continued)

Selection Level	Push Button Sequence	Result
Transition	6. Press LEFT or RIGHT until the transition symbol that you want to review is flashing. 7. To view other transitions, repeat step 6.	6. The selected transition symbol is flashing and its value is displayed.
Stitch	8. To view the Stitch level: a. Press LEFT or RIGHT until "X" is flashing on the transition level. b. Press DOWN. 9. If stitching was deactivated in the Program mode for the channel you are reviewing, do one of the following: a. Press UP to move to any previous level. b. Press SET to exit the parameter review. 10. If stitching was activated in the Program mode for the channel you are reviewing: • Press LEFT or RIGHT to move to the stitch percentage or bead length symbol.	• The stitch symbol is displayed and "X" is flashing on the Stitch level. • "X" is flashing on the selected level. • The program returns to the default (Run) mode. • The selected symbol is flashing and its value is displayed.
Move to any other selection level, or exit parameter review.	11. When you are finished viewing the Stitch level, do one of the following: • Press UP to move to any previous level. • Press SET to exit the parameter review.	• "X" is flashing on the selected level. • The program returns to the default (Run) mode.

7. Configure Mode

CAUTION: Removing memories in Configure mode erases all parameter values for those memories. Removing parameters can erase programmed values for some or all memories and/or channels. Only the parameters you select in Configure will be accessible in the Program and Run modes. Nordson recommends that Configure mode be utilized ***only*** in initial set-up or for intended system modification. To routinely activate and deactivate parameters, use the Program mode.

Purpose

This mode gives you the ability to:

- select the number of memories ***available*** for programming, and to
- select the parameters ***available*** for programming.

Accessing Configuration Mode

Press the Nordson Oval and SET buttons at the same time. The Configuration mode display is shown (Figure 4.18).

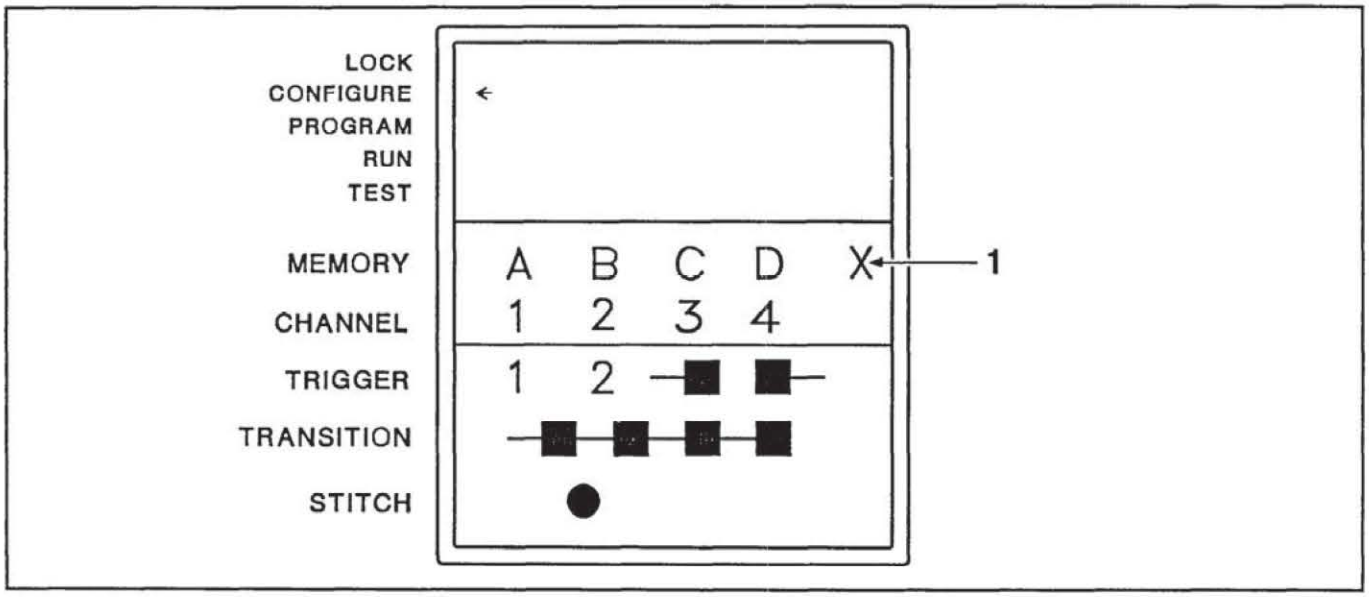


Figure 4.18 - Configuration mode defaults

1 – "X" flashing

Changing Selection Levels

While "X" is flashing, press DOWN or UP.

Exiting Configure

While "X" is flashing, press SET.

Selecting Available Parameters

Available Memories

Configuration Choice	Push Button Sequence
One Memory	1. Press LEFT or RIGHT until memory letter, "A", is flashing. 2. Press SET.
Two Memories	1. Press LEFT or RIGHT until memory letter, "B", is flashing. 2. Press SET.
Three Memories	1. Press LEFT or RIGHT until memory letter, "C", is flashing. 2. Press SET.
Four Memories	1. Press LEFT or RIGHT until memory letter, "D", is flashing. 2. Press SET.

Available Channels

Configuration Choice	Push Button Sequence
One Channel	1. Press LEFT or RIGHT until channel number, "1", is flashing. 2. Press SET.
Two Channels	1. Press LEFT or RIGHT until channel number, "2", is flashing. 2. Press SET.
Three Channels	1. Press LEFT or RIGHT until channel number, "3", is flashing. 2. Press SET.
Four Channels	1. Press LEFT or RIGHT until channel number, "4", is flashing. 2. Press SET.

Available Trigger and Edge Choices

NOTE: Two selections are made in this level: trigger (1 or 2), and edge symbol (leading or trailing edge).

Trigger Choice	Push Button Sequence
One Trigger	1. Press LEFT or RIGHT until trigger number, "1", is flashing. 2. Press SET. 3. Press LEFT or RIGHT to select an edge symbol (refer to "Edge Symbol Choice," below.

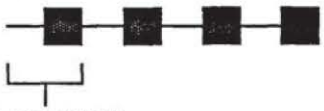
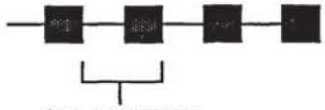
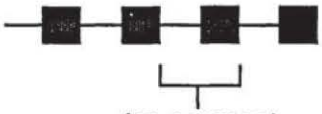
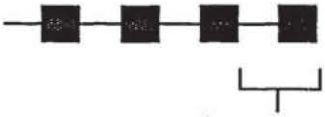
Selecting Available Parameters **Available Trigger and Edge Choices (continued)**

(continued)

Trigger Choice	Push Button Sequence
Two Triggers	1. Press LEFT or RIGHT until trigger number, "2", is flashing. 2. Press SET. 3. Press LEFT or RIGHT to select an edge symbol (refer to "Edge Symbol Choice," below).
Edge Symbol Choice	Push Button Sequence
	1. Press LEFT or RIGHT until the symbol is flashing. 2. Press SET.
	1. Press LEFT or RIGHT until the symbol is flashing. 2. Press SET.

Available Transitions

NOTE: Transitions are made available in pairs (one delay and duration).

Configuration Choice	Push Button Sequence
One Transition Pair:  (FLASHING)	1. Press LEFT or RIGHT until the left-most transition pair is flashing. 2. Press SET.
Two Transition Pairs:  (FLASHING)	1. Press LEFT or RIGHT until the second transition pair from the left is flashing. 2. Press SET.
Three Transition Pairs:  (FLASHING)	1. Press LEFT or RIGHT until the third transition pair from the left is flashing. 2. Press SET.
Four Transition Pairs:  (FLASHING)	1. Press LEFT or RIGHT until the right-most transition pair is flashing. 2. Press SET.

Selecting Available Parameters
(continued)

Stitch-off or Stitch-on

NOTE: The stitch choice applies to all available memories and channels. For example, selecting stitch-off in Configuration makes stitch unavailable for use in any pattern.

NOTE: To selectively turn stitch on or off for some patterns, select stitch-on in Configuration mode. Then use Program mode to turn stitch off or on for a particular pattern.

Configuration Choice	Push Button Sequence
Stitch-off ○	1. Press LEFT or RIGHT until the stitch-off symbol is flashing. 2. Press SET.
Stitch-on ●	1. Press LEFT or RIGHT until the stitch-on symbol is flashing. 2. Press SET.

Section 5

Troubleshooting

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Section 5
Troubleshooting

1. Introduction

In this section you will find fault isolation and correction procedures.

Obvious causes of malfunction, such as broken wires, missing or loose fasteners, etc. should be noted during daily visual inspection and corrected immediately.

2. Safety Precautions

WARNING: Before performing any troubleshooting procedures, thoroughly review Section 1, Safety Summary, in this manual. Only qualified personnel are to perform any troubleshooting procedures.

WARNING: Even when switched off, Nordson applicators and the PC40 contain electrical potentials that can cause death. Before opening any of these units to check or make electrical connections, disconnect and lock out input electrical power.

3. Troubleshooting Checklist Following Initial Installation

Check for the items listed below if the PC40 is not operating after you initially install it:

- proper power,
- PC40 power switch in the on position,
- PC40 fuse good, and
- correct sensor selected.

If the unit still is not operating, go to the detailed troubleshooting procedures that follow in this section.

4. Guns Not Firing

Problem	Possible Reason	Corrective Action	Refer to
PC40 status LED red. (**NOTE:** It is normal for this LED to light red at unit power-up. After a brief self-test, it will light green.)	Selecting an unconfigured memory via remote memory select line.	Select configured memory or make unconfigured memory available.	Sec. 4, "Configure Mode".
	PC 40 has failed internal diagnostics check.	Replace unit; contact your Nordson representative.	
PC40 status LED dark.	Power switch in OFF position.	Move switch to ON postion.	
	Defective fuse.	Check; replace if necessary.	
	No input power to PC40.	Turn power ON	
	Incorrect or missing wire connections in PC40.	Turn power to PC40 OFF; remove front assembly and check connections.	Figure 5.1.
	PC40 failure.	Replace; contact Nordson representative.	
PC40 output LED(s) lighting.	No applicator power.	Check that applicator breaker switch ON; check for input line voltage if necessary.	Applicator manual.
	Insufficient system pressure.	Check for proper pressure and adjust if necessary.	Applicator manual.
	Incorrect or missing wire connections in PC40.	Select Test mode (press and hold Nordson oval until arrow on LCD points to "TEST"; press LEFT or RIGHT to select channel; press SET and check for 240 VAC or at solenoids; if no power present, turn PC40 power OFF, remove front assembly, and check output connections.	Figure 5.1
	Gun and/or solenoid problem.	Follow troubleshooting procedure in gun and/or solenoid manual.	Gun and/or solenoid manual.

4. Guns Not Firing (continued)

Problem	Possible Reason	Corrective Action	Refer to
PC40 trigger input LED(s) dark.	Sensors not mounted within operating range.	Mount within proper range.	
	Sensor misaligned.	Check; align if necessary.	
	Dirty sensor lenses and/or retroreflector.	Clean lenses and/or retroreflector.	
	Damaged sensor wires.	Inspect and replace or repair as necessary.	
	Incorrect or missing wire connections.	Turn power to PC40 OFF; remove front assembly and check connections.	Figure 5.1
	Sensor failure.	Replace; contact your Nordson representative.	
	PC40 failure.	Replace; contact your Nordson representative.	
PC40 output LED(s) dark.	Sensor or sensor wiring problem.	Check if PC40 input LEDs also dark; if so, go to "PC40 trigger input LEDs dark," earlier in this section.	
	Wrong memory selected.	Select the correct memory.	Sec. 4, "Programming Memory."
	Channel not configured.	Configure channel.	Sec. 4, "Selecting Available Parameters."
	Channel not activated.	Activate channel.	Sec. 4, "Programming Channel."
	PC40 failure.	Replace; contact your Nordson representative.	

5. Gun(s) Firing Between Patterns

Problem	Possible Reason	Corrective Action	Refer to
Gun(s) firing between patterns, diffuse reflective sensors.	Sensor mode set incorrectly.	Adjust light/dark operate switch to intended mode.	Sec.4, Table 4.1.
	PC40 sensor mode, location, and edge symbol parameters set incorrectly.	Correct settings in Program mode.	Sec. 4, "Programming Trigger."
	Sensors not mounted within operating range.	Mount within proper range.	Sec. 7.
	Dirty lenses and/or retroreflector.	Clean lenses and/or retroreflector.	
	Sensor responding to objects in line background, such as cams, levers, etc.	Observe sensor LED to see if sensor responding to background objects; if so, adjust gain setting and/or follow alignment tips.	Sec. 3, "Aligning Sensors" and "Tips for Minimizing Unwanted Triggering."
	Inductive interference (electrical noise) from power or solenoid cables.	Route sensor cables away from power and output wiring.	
Guns firing between patterns, opposed and retroreflective sensors.	Sensor mode set incorrectly.	Adjust light/dark operate switch to intended mode.	Sec. 4, Table 4.1.
	PC40 sensor mode, location, and edge symbol parameters set incorrectly.	Correct settings in Program mode.	Sec. 4, "Programming Trigger."
	Sensors not mounted within operating range.	Mount within proper range.	Sec. 7.
	Dirty sensor lenses and/or retroreflector.	Clean lenses and/or retroreflector.	
	Emitter and receiver/reflector misaligned.	Align sensor components.	Sec. 3, "Aligning Sensors."

5. Gun(s) Firing Between Patterns (continued)

Problem	Possible Reason	Corrective Action	Refer to
Guns firing between patterns, opposed and retroreflective sensors *(continued)*.	(Retroreflective sensor only) sensor reacting to reflections from substrate.	Observe sensor LED to see if sensor reacting to reflections; if so, adjust gain setting; if sensor still reacts to reflections, mount emitter and reflector to an angle to line travel or use Nordson polarized retroreflective sensor.	Sec. 3, "Aligning Sensors"..
	Inductive interference (noise) from power or solenoid cables.	Route sensor cables away from power and output wiring.	

6. Other Gun Firing Problems

Problem	Possible Reason	Corrective Action	Refer to
Gun(s) firing coincidently with other machine operation.	Sensor mode set incorrectly.	Correct settings.	Sec. 4, "Programming Trigger."
	Sensors wired incorrectly.	Correct wiring.	Figure 5.1 or 5.2.
	Inductive interference (noise) from machine control or other relay.	Install a noise suppressor across the coil of the relay and/or contactor.	
	Noise from machine operation occurs at the end of the substrate and causes a false trigger.	Adjust the last transition to occur beyond the sensor reset point.	Sec. 4, "Programming Transition."
	Limit switch bounce at end of the substrate causes a false trigger.	Adjust last transition to occur beyond the switch reset point.	Sec. 4, "Programming Transition."
Gun(s) firing for every other product, or intermittently skips products.	Product spaced too closely (pattern overlap is not allowed by PC40).	Adjust the spacing of the substates, and/or the gun and sensor. Or, if product spacing cannot be changed, consider using two channels wired in parallel and triggered alternately. If this does not solve the problem, contact your Nordson representative.	

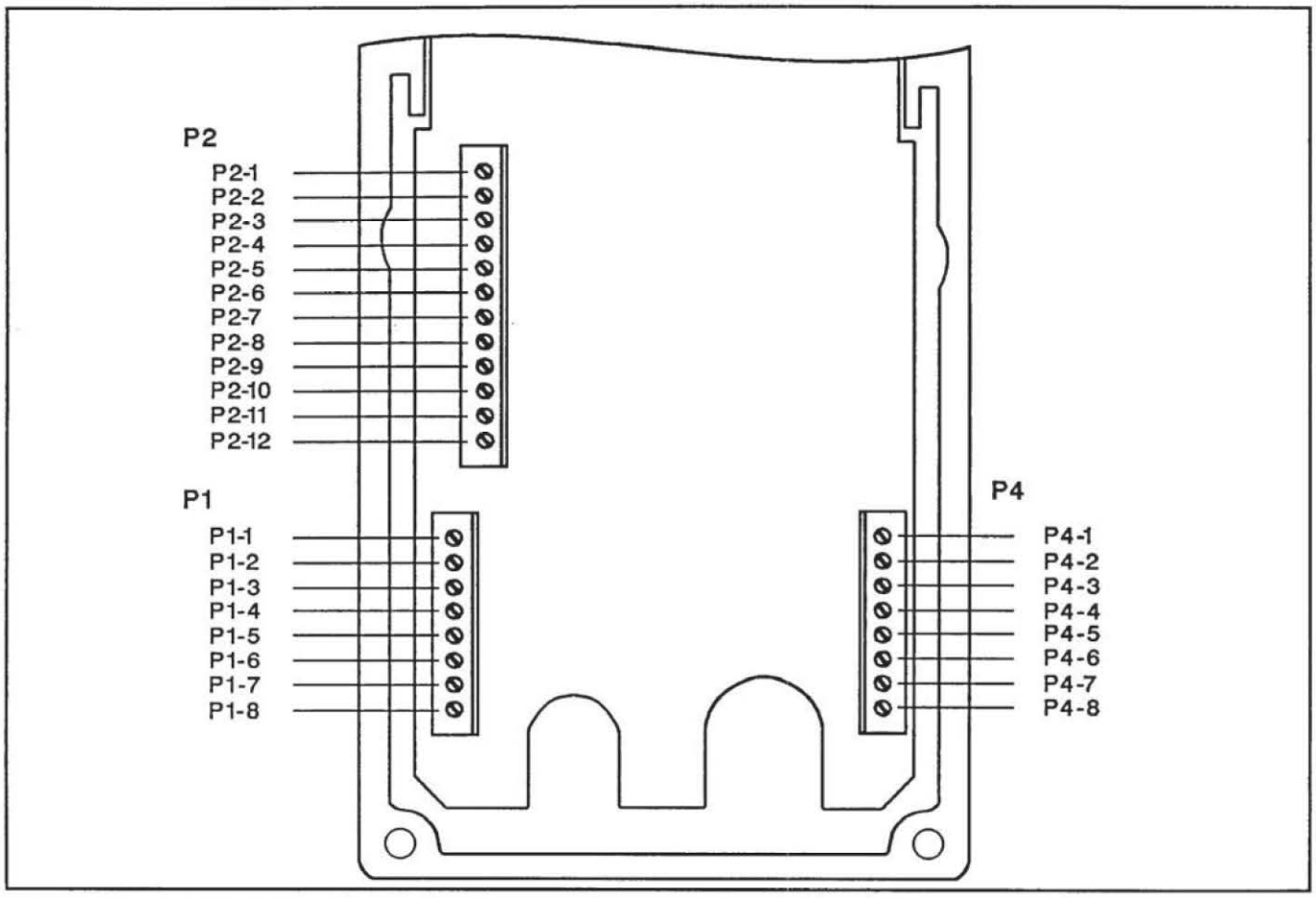

Figure 5.1 - PC40 240 VAC model terminal block connections

P2 (Power and Outputs):

P2-1 (AC 240V L1)
P2-2 (AC 240V - Neutral)
P2-3 (AC Safety Ground) (1)
P2-4 (NC)
P2-5 (Valve 1 Return - Neutral)
P2-6 (Valve 1)
P2-7 (Valve 2 Return - Neutral)
P2-8 (Valve 2)
P2-9 (Valve 3 Return - Neutral)
P2-10 (Valve 3)
P2-11 (Valve 4 Return - Neutral)
P2-12 (Valve 4)

P1 (Remote Control):

P1-1 (Shield)
P1-2 (Ground)
P1-3 (Common - connect to Ground or +12V; refer to "Remote Pin Characterization, in Section 3)
P1-4 (Lock)
P1-5 (Remote Memory Select 3)
P1-6 (Remote Memory Select 2)
P1-7 (Remote Memory Select 1)
P1-8 (+12V)

P4 (Trigger Inputs):

P4-1 (+12V)
P4-2 (Trigger 1)
P4-3 (Ground)
P4-4 (Shield)
P4-5 (+12V)
P4-6 (Trigger 2)
P4-7 (Ground)
P4-8 (Shield)

(1) Join multiple safety grounds (as from several AC solenoids) with a connector, wire nut, etc. before connecting them to P2-3.

Section 6

Service Parts and Reference Data

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Section 6
Service Parts and Reference Data

1. Introduction

This section contains the service parts list, plus the PC40 specifications.

Table 6.1 lists the service equipment for the PC40 AC models.

2. Using the Parts List

- The part number column gives the Nordson part number. A dash indicates that the item is not for sale or is a subassembly of a saleable assembly.
- The description column provides the part's name, dimension's and the physical properties. A part preceded by one bullet (•) is a component of the assembly above it.
- The quantity required (Qty. Req'd.) column indicates the quantity requirements per unit or assembly. If the item is listed for reference only, "Ref" appears in the column.

3. Service Parts

PC40 Pattern Control Service Parts

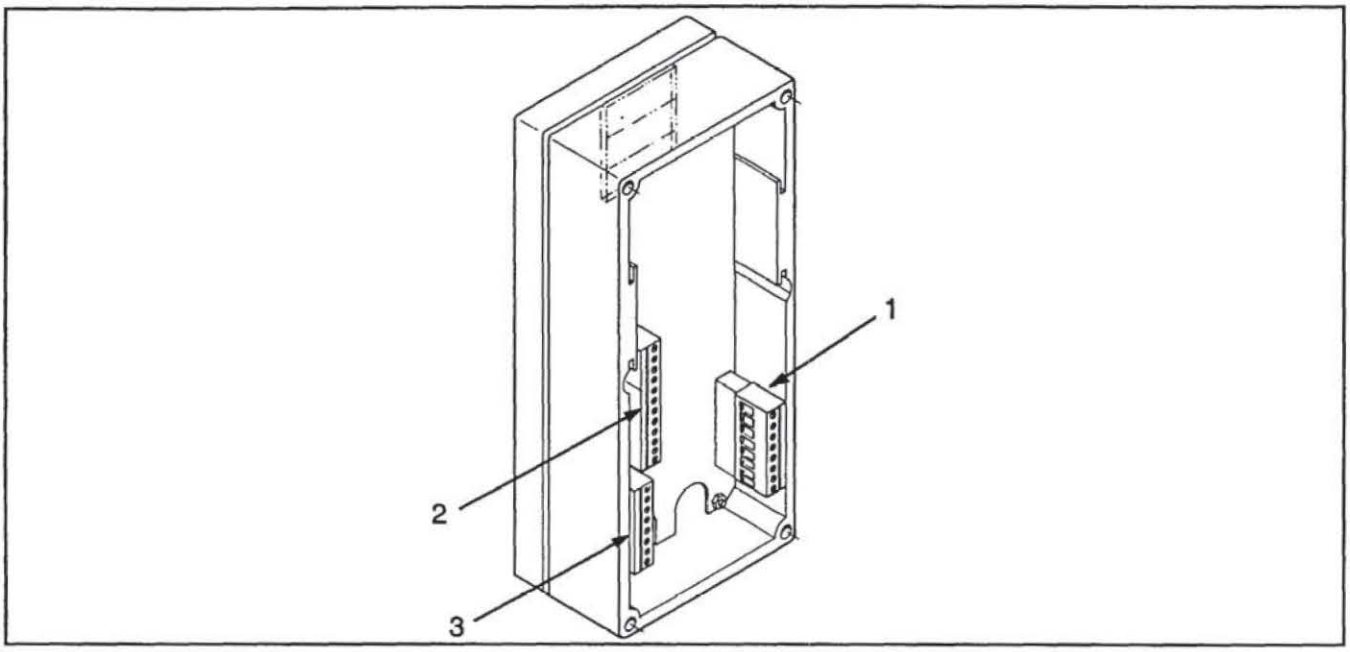

Figure 6.1 - PC40 front assembly, rear view

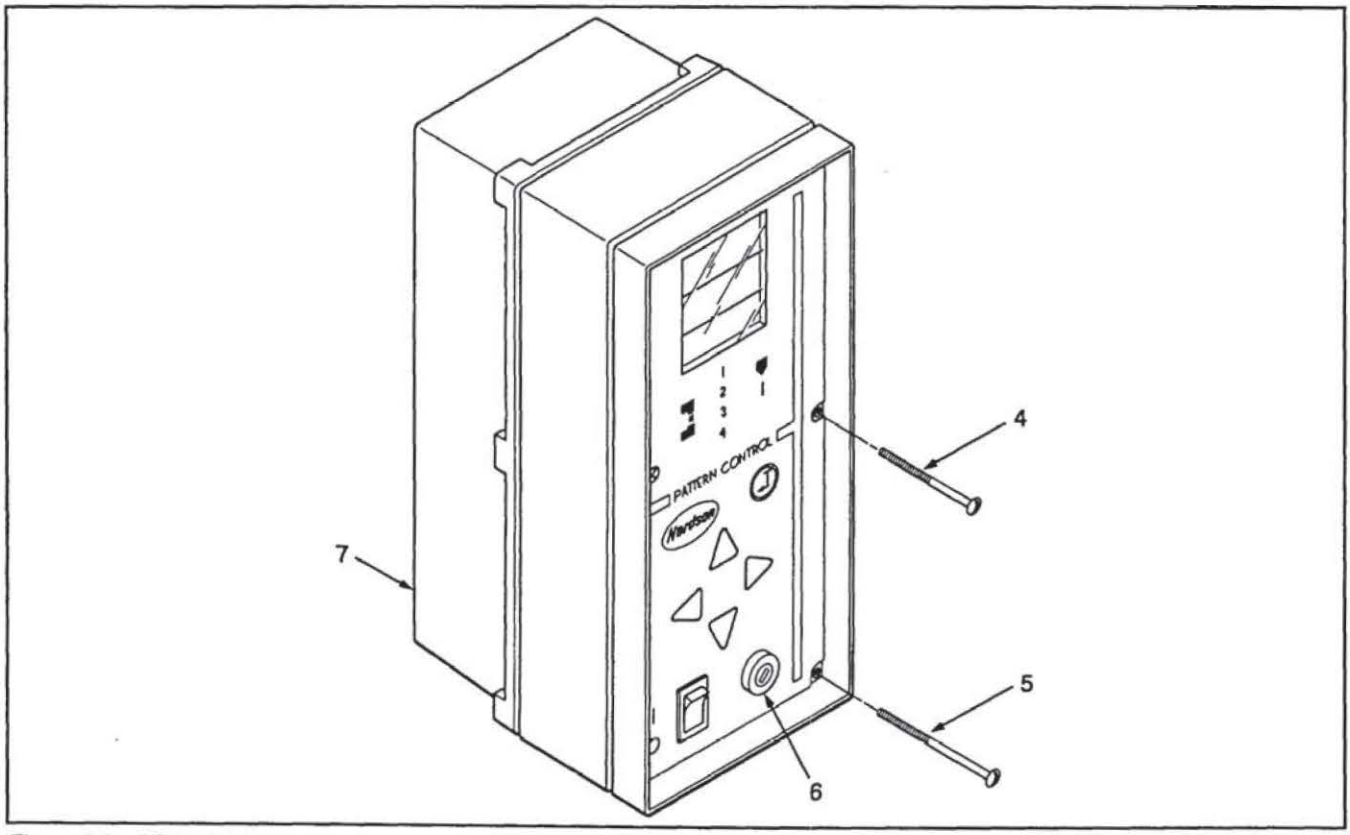

Figure 6.2 - PC40, front view

PC40 Pattern Control Service Parts

(continued)

Table 6.1 PC40 Service Equipment

Item Number	Part Number	Description	Qty. Req'd.
-	154 820	PC40 AC Timer, 240V	Ref
1	972 801	• 8-pin connector, right	1
2	972 547	• 12-pin connector	1
3	972 800	• 8-pin connector, left	1
4	981 524	• Truss head screw, #4-40x1.5 in.	2
5	981 525	• Truss head screw, #4-40x2 in.	4
6	114 875	Fuse, 5A, 250V	1
7	146 379	Back Enclosure	Ref
-	134 789	Remote Memory Select Switch, 4 Position (1)	Ref
-	116 566	Knob (2)	Ref
-	117 896	Keyed Lock Out Switch, DPDT	Ref
-	131 473	Emitter for Opposed Mode (Through-beam) Sensor	Ref
-	131 486	Receiver for Opposed Mode (Through-beam) Sensor	Ref
-	131 474	Retroreflective Sensor	Ref
-	131 475	Polarizing Retroreflective Sensor	Ref
-	131 476	Diffuse Mode Sensor	Ref
-	145 278	Bifurcated Fiber Optic Cable (3)	Ref
-	145 279	Replacement Cover for Diffuse Mode Sensor (4)	Ref
-	145 974	Lens Kit (5)	Ref

(1) Also order Knob, P/N 116 566.

(2) Required with Remote Memory Select Switch, P/N 134 789.

(3) Required to convert Diffuse Mode Sensor, P/N 131 476, to fiber optic operation. Also, order Replacement Cover, P/N 145 279.

(4) Required with Bifurcated Fiber Optic Cable, P/N 145 278.

(5) Provides fiber optic retro-reflective capability for Diffuse Mode Sensor, P/N 131 476.

4. Specifications

PC40 Specifications

Programming Flexibility	
Output Channels	Four (4) independent outputs for multiple gun installations.
Pattern Storage	Four memories selectable via front panel interface or remote inputs; each memory capable of storing a pattern for each of the four output channels.
Pattern Complexity	Eight (8) transitions per channel: four delays (gun off) and four durations (gun on).
Triggers	Two (2) trigger inputs which can operate as either leading or trailing signals. One trigger can initiate all four outputs, or outputs may be assigned independently to either leading or trailing trigger.
Pattern Changes	Dynamic programming capability allows changes to pattern while unit is operating.
Remote Memory Capability	Remote memory selection allows memory selection from a central location.
Stitching Capability	Can be set independently for each channel; provides pattern flexibilty and reduces material usage.
Timing Parameters	
Time Base	Crystal oscillator.
Time Range	2 - 9999 ms (0.000 - 9.999 seconds).
Setting Precision	+ / – 1 ms.
Accuracy	+10 ms, –1 ms for the first delay; bead lengths 0.01% of setting.
Temperature Drift	0.01% of set time over the operating range.
User Interface	
LCD Screen	4-digit, 7-segment numerical display area plus selection level displays MEMORY, CHANNEL, TRIGGER, TRANSITION, and STITCH.
LED Indicators	Trigger inputs, timer outputs, power on, and error conditions allow quick verification.
Setup Controls	Up, down, left, and right arrow push buttons for numerical increment and decrement, and for choosing program level selections; SET (enter); Nordson Oval (test and critical parameter control) push buttons.
Data Retention	EEPROM with 10,000 read/write capabilities.

PC40 Specifications

(continued)

Inputs

Input Voltages	200 - 240 VAC (50/60HZ) nominal; 170 VAC low limit, 264 VAC high limit.
Trigger Inputs	Accepts sensor with NPN (current sinking type) output or contact closure.

Outputs

• Sensor supply	12 VDC, 500 mA maximum including all connections to +12V connections.
• Solenoid	240 VAC, 1A max. per channel.

Environmental Parameters

Operating Temperature	Control module: 32° to 122° F (0° to 50° C).
Operating Humidity	5% to 95% noncondensing.
Storage Temperature	4° to 185° F (20° to 85° C).

Mechanical

Dimensions	Height: 9 in. (22.9 cm); Width: 4 in. (10.2 cm); Depth: 4.4 in. (11.2 cm).
Mounting	On wall, machine surface, or DIN rail.
Enclosure Rating	Meets IP54 requirements for moisture and dust protection when fitted with electrical conduit.

Approvals

Designed for U.L. and C.S.A. Approvals	Package, components, and construction.

Photosensors Specifications

Input Voltage	10-30 VDC at less than 25 mA (exclusive of load).
Output Configuration	One current sourcing (PNP) and one current sinking (NPN) open collector transistor.
Output Rating	150 mA max. each output at 77° F (25° C); derated to 100 mA at 158° F (77° C). Derates approx. 1 mA per °C.
Response Time	1 ms.
Indicator LED	Signal strength indicator.
Operating Range	4° F (20° C) to 158° F (70° C).
Effective Ranges	
• Opposed Mode Sensors	Up to 10 ft (304.8 cm).
• Diffuse Reflective Sensors	2 in. (5.1 cm) to 15 in. (38.1 cm).
• Retroreflective Sensors (NonPolarized)	Up to 15 ft (457.2 cm).
• Retroreflective Sensors (Polarized)	Up to 7 ft (213.4 cm).